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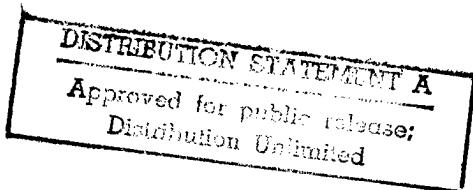


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EAST ASIA

JAPAN

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MILITARY

SELF-DEFENSE FORCES' AIR COMBAT CAPABILITIES DISCUSSED

Tokyo GUNJI KENKYU in Japanese May 87 pp 62-71

[Article by journalist Isao Miyamoto]

[Text] As the second year of the fiscal 1987 Mid-term Defense Buildup Plan, it is an important year for setting the course for success or failure in the achievement of goals. The Japan Defense Agency (JDA) will procure a total of 108 aircraft in FY 1987. The breakdown of this 108 aircraft is 32 for the Ground Self-Defense Force (GSDF), 35 for the Maritime Self-Defense Force (MSDF), and 41 for the Air Self-Defense Force (ASDF).

Fiscal 1987 is also a year in which there will be great progress in replacement of mainforce aircraft in the ASDF and MSDF. There are a total of 10 interceptor-fighter units possessed by the ASDF. As of the end of fiscal 1986, there were four F-15J squadrons to five F-4EJ squadrons. Currently, one squadron is undergoing renovation in aircraft type from the F-4 to the F-15 and the changeover will be complete in fiscal 1987, making a balance of five to five in the strength ratio of F-4's and F-15's.

In the case of the MSDF also, they will possess 39 each of P-2J and P-3C at the end of fiscal 1987, a perfect balance in the aspect of number of aircraft. The relationship is reversed in the flight squadrons with three P-2J squadrons to four P-3C squadrons. The generation replacement of mainforce aircraft is proceeding steadily.

In the GSDF, on the other hand, the second anti-tank helicopter squadron has been formed and full-scale personnel training has begun for the CH-47J transport helicopter. There is only one aircraft, but deployment of the CH-47J is being made to the 1st Helicopter Group.

Below, a review will be attempted on Self-Defense Force aviation in fiscal 1987 when the transformation is completed with the replacement of mainforce aircraft and introduction of new aircraft. First, let's begin with the ASDF where aircraft holds a relatively high importance.

ASDF

A total of 39 aircraft of various types will be procured by the Air Self-Defense Force in fiscal 1987. The breakdown is 12 F-15J/DJ interceptor-fighters, 3 C-130H transports, 20 T-4 intermediate trainers, 2 CH-47J transport helicopters, and 2 V-107A rescue helicopters. In addition, it should be noted that the measures to upgrade the capability of the F-4EJ interceptor-fighter, which had been a pending issue, was moved to implementation and the mass remodeling of 8 aircraft was approved.

In unit operational items, the 303d Squadron will complete conversion to F-15J during fiscal 1987 and by this, the balance sheet occupied by F-4's and F-15's in interceptor-fighter squadrons will be equal. This 303d Squadron is the first unit to convert from the F-4J to the F-15J.

Similarly, the new formation and inauguration of the "Emergency Iruma Helicopter Transport Unit" directly under the Central Air Defense Force is scheduled in the third and fourth quarters of fiscal 1987. This "Emergency Iruma Helicopter Transport Unit" is the unit in charge of CH-47J terminal transport helicopter operations.

From the aspect of instructional training, it is noteworthy that the annual flight time for fighter pilots has been increased 10 percent. The 146.5 hours per person in fiscal 1986 has been increased to 160.5 hours this fiscal year.

The Air Self-Defense Force intends in the next 10 years to have fighter pilot flight time at 180 hours, on par with NATO air forces, and following last year, it has taken the first step toward 180 hours. It can be appreciated as an indication of a bright outlook for the future.

Procurement and Deployment of Aircraft

As stated before, 12 F-15's will be procured in fiscal 1987. The breakdown of the 12 aircraft is 6 each single-seaters and two-seaters.

Among the 6 F-15J's procured in fiscal 1987, 4 are required to make a 22-aircraft formation from the current 18 aircraft as the authorized number for F-15 squadrons of the 2d Air Wing (Chitose Air Base). The remaining two will be transferred as spares. The increase in the authorized number of aircraft for squadrons is to deal with the increase in the number of scrambles in recent years. It is considered difficult to conduct training with the current 18-aircraft system and the increase has been greatly desired for sometime.

For the time being in the ASDF, attention will first be given to the 2d Air Wing which has many scrambles, with the intention of making the three F-15 squadrons 22-aircraft formations. However, the realization of the increase in the authorized number will be in fiscal 1990 when the procurement portion for this fiscal year will be acquired.

On the other hand, the 6 F-15DJ's procured in fiscal 1987 will be allocated to renovation of the aircraft type for the Flight Training Squadron and spares. The Flight Training Squadron currently has T-2's, but there are performance

limits for training operations with the T-2, and it is very significant that this will be replaced with the F-15.

The deployment of the F-14DJ to the Flight Training Squadron also will be in fiscal 1990.

It is not a new procurement, but one of the highlights of fiscal 1987 is the mass renovation and transfer of F-4EJ aircraft with upgraded capability. The plan to upgrade the capability of the F-4EJ was started with a trial renovation in fiscal 1981 and up until the middle of fiscal 1985, a series of technical and utility tests have been conducted. In September 1986, the director of JDA gave approval for unit use. At that time, a decision was made in conjunction to name it the "Improved F-4EJ."

After obtaining the approval of the Security Council in December 1986, a request was made for renovation of 10 aircraft to the Improved F-4EJ in the fiscal 1987 budget draft and 8 were approved in the budget. The ASDF currently has the intention of making 96 of the 127 F-4EJ into the Improved F-4EJ. These renovations will be implemented in consecutive year plans for a 7-year period.

The remodeling to the Improved F-4EJ will be implemented along with scheduled airframe maintenance (IRAN). Renovation costs in fiscal 1987 are 1.8 billion yen per aircraft. Deployment of the eight aircraft requested this fiscal year will be five to the 306th Squadron, two to the 1st Technical School for teaching use, and one to the Air Proving Wing. Acquisition of the airframes will be in fiscal 1989.

The T-4 Intermediate Trainer has the largest number of aircraft to be procured in fiscal 1987. Twenty T-4's are to be procured in fiscal 1987. The volume procurement of T-4 follows 12 aircraft in fiscal 1986 for an aggregate total of 36 aircraft, including 4 XT-4.

Development work on the T-4 Intermediate Trainer will be completed at the end of fiscal 1987 and next fiscal year, trial operation and operation tests will begin in units directly under the Flying Training Command. Following introduction of the T-4 unit, it first will replace the T-33A for teaching use in basic flying courses. At this point in time, complete domestic manufacture of trainers has been achieved from the T-3 to T-1 to T-4 to T-2.

On the other hand, the additional procurement of C-130H transports and CH-47J transport helicopters is aimed at the improvement and strengthening of the air transport system. Both the C-130H and the CH-47J aircraft procured this fiscal year will be acquired in fiscal 1989. By this, a 12 C-130H aircraft system will be established.

Similarly, the two CH-47J will be deployed to the Central Air Defense Force at Iruma Air Base. This will complete deployment of aircraft to the Northern Air Defense Force (three aircraft) and the Central Air Defense Force (four aircraft). This CH-47J, as a terminal transport helicopter, will be in charge of air transport of materials and personnel from the nearest base (airfield) to detachments. It is called a terminal transport helicopter because it is in

charge of the terminal portion of the transport route. It is scheduled to be deployed to the three Air Defense Forces and the Southwestern Composite Air Division.

So far, seven CH-47J aircraft have been procured, including the two aircraft this fiscal year. Procurement is planned at present for five aircraft in fiscal 1988 and thereafter for deployment to the remaining Western Air Defense Force and Southwestern Composite Air Division.

Along with the deployment of the CH-47J, a reorganization of the Air Rescue Wing will be conducted and as stated before, an "Emergency Iruma Helicopter Transport Unit" will be formed in the middle of fiscal 1987. In a related item to the Air Rescue Wing, selection of the aircraft type for the HH-X next generation rescue helicopter has been postponed one year and additional procurement of four V-107A will be conducted which should supplement this. Procurement of the V-107A rescue helicopter will end with this fiscal year's portion of four aircraft.

It had appeared that a decision in fact was made on the HH-60J for the attention-getting next generation rescue helicopter, but this had a close relationship with procurement of the MSDF SH-60J and the request this fiscal year was delayed. Prospects are that the policy will be decided during fiscal 1987 and procurement will begin next fiscal year.

According to what has been reported so far, the HH-60J has 45 percent in common with the SH-60J and it is equipped with a night vision device for nighttime use.

Unit Operation, Other

There are no great actions in the aspect of unit reorganization, but the fifth F-15 flight squadron will be born during fiscal 1987. This will end the conversion of the 303d Flight Squadron at Komatsu Air Base from F-4EJ to F-15J. The 303d Flight Squadron is the first unit to convert aircraft type from the F-4 to the F-15. By this, the balance sheet occupied by F-4 and F-15 in the 10 interceptor-fighter flight squadrons will be completely equal at the end of fiscal 1987.

The organization of the sixth F-15 unit following the 303d Flight Squadron in fiscal 1987 is scheduled for fiscal 1989 and will renovate the aircraft type of the 304th Flight Squadron at Tsuiki Air Base.

Noteworthy in the aspect of instruction and training is the increase in annual flight time for fighter pilots. The annual flight time for one fighter pilot set by regulation is 200 hours. This standard was maintained until about 1970.

However, fighter pilot annual flight time quickly dropped to 140 hours following the oil shock and that status has continued for a long time. It was somewhat raised in fiscal 1986 and became 145-146 hours. This fiscal year, it will be further increased 10 percent and be restored to 160.5 hours. The ASDF has the intention of increasing it in the future to 180 hours, which is the

standard of NATO air forces, and they hope to accomplish this in 10 years. For the time being, a foothold has been established.

So far, the discussion has focused on fiscal 1987 aircraft procurement and squadron operation items, but the modernization of other aspects, such as the air defense units and control and warning units is proceeding steadily. Similarly, the formation of base air defense units is proceeding and this fiscal year, the 301st Base Air Defense Unit will be newly formed and inaugurated at Komatsu Air Base directly under the Central Air Defense Force.

It can be said that the modernization of Air Self-Defense Force equipment in various fields such as the F-15J, PATRIOT SAM, and the new BADGE [Base Air Defense Ground Environment] system is progressing at a steady pace.

Maritime Self-Defense Force

In fiscal 1987, the Maritime Self-Defense Force will newly procure 35 aircraft. The breakdown of aircraft is 9 P-3C anti-submarine patrol aircraft, 17 HSS-2B anti-submarine helicopters, and 2 MH-53E minesweeping helicopters (the above tactical aircraft) and in addition, 1 aircraft each of U-36A training support aircraft, EP-3 electronic warfare data collection aircraft, and LC-90 liaison aircraft, and 2 aircraft each of KM-2 Improved Trainers and OH-6D helicopters.

The MSDF is currently heading toward a 100 P-3C aircraft system and provision of the aircraft is proceeding aggressively. The aggregate total procurement has reached 69 aircraft, including the 9 aircraft this fiscal year. There are 31 remaining aircraft in the calculation, but because there will be airframes which will reach the 7,500 hours life expectancy and become decommissioned in the meantime, the final procurement amount of P-3C's probably will exceed 100 aircraft if this supplement is included.

Procurement of 17 HSS-2B anti-submarine helicopters was decided, but it will end with this. Beginning in fiscal 1988, a switch will be made to full-scale procurement of SH-60J new anti-submarine helicopters. The breakdown of the 17 aircraft is 9 for shipboard and 8 for land-based. This request was up to the limit of the production capability of the manufacturer.

The number of MSDF land-based anti-submarine helicopters is markedly inadequate and that is a strong reason why this volume procurement is covering the portion that had been defeated up to the previous fiscal year. At any rate, a stop has been put to the procurement of the HSS-2 system, which began in 1963, at an aggregate total of 167 aircraft.

The procurement of the MH-53E minesweeping helicopter follows four aircraft procured last fiscal year. In the Mid-term Defense Buildup Plan, 12 MH-53E aircraft are to be introduced, a result of calculating the number required for simultaneous operations at the two major port facilities, Tokyo Bay and from the Kii Channel to Osaka Bay.

Deployment of the MH-53E will begin in fiscal 1989 and in fiscal 1990 there will be a total of six aircraft, including the two aircraft to be procured

this fiscal year. The MH-53E, which has the combined function of a transport helicopter, exists as what might be called "the anticipated new star" of the MSDF, along with the P-3C.

The EP-3 electronic warfare data collection aircraft is in an airframe category other than combat aircraft, but is considered a noteworthy new procurement aircraft. This is a replacement for the one UP-2J that will be decommissioned in fiscal 1990 and is an effort to upgrade both flight performance and intelligence collection capability.

As a link in the upgrading of electronic warfare capability, which is aggressively being taken up by the MSDF, the collection as well as analysis and evaluation of daily radio information is an indispensable activity. For that reason alone, the introduction of the EP-3 is to be enthusiastically noted.

Similarly, the one U-36A training support aircraft to be procured is the fourth aircraft in all to be budgeted. Two more aircraft will be procured in the future and the U-36A will be employed as a six-aircraft system. The 81st Flight Squadron at Iwakuni Air Base will be in charge of operating both this U-36A and the aforementioned EP-3 electronic warfare data collection aircraft.

Fiscal 1987 Unit Reorganization

A large-scale reorganization of MSDF air units is scheduled for fiscal 1987.

The largest of the series of unit reorganizations in fiscal 1987 is the new formation of the 22d Air Wing. The newly formed 22d Air Wing will be established at Omura Air Base in Nagasaki Prefecture. In addition to the headquarters, it will be composed of the 122d and 123d Flight Squadrons, the 22d Support Service Squadron, and the Omura Air Base Squadron.

The birth of a new air wing in the MSDF is the first since the reorganization of the Okinawa Flight Squadron into the 5th Air Wing in fiscal 1981.

In connection with this new formation of the 22d Air Wing, the 123d Flight Squadron will be newly formed as the third shipborne helicopter unit. The 122d Flight Squadron will be reformed from the 21st Air Wing and similarly, the 22d Support Service Squadron will be reorganized from the Omura Service Unit. In the same fashion, the Omura Air Base Squadron will be reorganized, expanding the organization from the Omura Base Unit.

Along with this reorganization, the Omura Air Squadron will become an A formation unit of just a flight squadron and attendant service unit from the existing B formation. Conversely to the present, the 22d Air Wing will provide service support and base operations for the Omura Air Squadron. In other words, the relationship of head and subordinate has been reversed.

On the other hand, the 21st Air Wing will transfer the 122d Flight Squadron to the 22d Air Wing and the Komatsushima Air Squadron will be assigned under the command of the Kure District. The existing irregular tri-site operation will be eliminated and a streamlined formation will be made with the 101st and

121st Flight Squadrons and the 21st Support Service Squadron and Tateyama Air Base Squadron under the headquarters.

Along with this reorganization, there will be realization of clear assignment of duty with shipboard flight squadrons which are in charge of helicopter onboard support for the DDH and HATSUYUKI DD under the Fleet Air Force and the land-based anti-submarine helicopter units in charge of coastal defense under the various regional districts.

Also of note in MSDF aviation in fiscal 1987 is the deployment of P-3C to the Air Training Command. Along with this, there are changes in the crew training system.

At present, the four Air Training Groups at Ozuki, Tokushima, Kanoya, and Shimofusa are under the command of the Air Training Command. Each of these units are in charge of training the pilot and airmen crew in stages. With the fiscal 1987 reorganization, the Kanoya Air Training Group is abolished and the new 206th Air Training Squadron will be inaugurated to be in charge of P-3C crew training directly under the command of the Shimofusa Air Training Group.

This 206th Air Training Squadron is the unit in charge of centralized P-3C crew training. The training of new personnel with the P-2J will end in the middle of fiscal 1987. By this, the 203d Air Training Squadron currently in charge of teaching the P-2J "Practical Aircraft VP Course," will be abolished and this 203d Air Training Squadron will be the parent body for inaugurating the new 7th Flight Squadron.

The newly organized 7th Flight Squadron will be placed directly under the command of the 1st Air Wing at Kagoshima Air Base. As a result, the 1st Air Wing will be the unit having the two VP flight squadrons. On the other hand, the 211th Air Training Squadron in charge of helicopter crew training and under the command of the Kanoya Air Training Group will become a unit under the direct command of the Air Training Command and remain at Kanoya Air Base.

By this series of Air Training Command reorganizations, a radical change in the crew training system has been realized. The newly organized 206th Air Training Squadron is in charge of centralized training of P-3C personnel. The 205th Air Training Squadron under the command of the Shimofusa Air Training Group will continue to exist and will be in charge of basic training of the airman position category, including tacticians, as the stage prior to the P-3C.

MSDF crew training now is welcoming an age of using the P-3C for education of new personnel.

Ground Self-Defense Force

The Ground Self-Defense Force will procure a total of 32 aircraft in fiscal 1987. The breakdown is 8 AH-1S anti-tank helicopters, 12 OH-6D observation helicopters, 8 HU-1H multi-purpose helicopters, and 4 CH-47J transport helicopters. The procurement number for the three types of aircraft, the AH-1S, OH-6D, and CH-47J, is exactly the same as last fiscal year, but there are

8 HU-1H aircraft, an increase of 3 aircraft compared to the previous fiscal year.

The major item for fiscal 1987 is cited as "the provision of AH-1S necessary for the new organization of the 3d Anti-tank Helicopter Unit for improvement of aerial mobility anti-tank firepower." Continuing from the previous fiscal year, a budget of eight AH-1S was realized. At the end of fiscal 1986, a total of 16 AH-1S aircraft were possessed and at the end of this fiscal year, it will become 32 and in successive years until fiscal 1989, an increase of 8 aircraft per year is anticipated.

Four of the new CH-47J transport helicopters will be procured and the aggregate total since fiscal 1984 is 13 aircraft. This CH-47J is the airframe to replace the current V-107A. Replacement of the V-107A is being conducted at a ratio of three to two and in the end, procurement of 39 aircraft is scheduled.

The HU-1H multi-purpose helicopter is a replacement for the outdated HU-1B and will be deployed to the helicopter units of each Army. On the other hand, the OH-6D observation helicopter will be deployed to various division squadrons in addition to use for reconnaissance in anti-tank helicopter units. The airframes for the division squadrons are replacements for the OH-6J.

Trends in Fiscal 1987

Noteworthy in the actions such as unit reorganization is the new formation of the 2d Anti-tank Helicopter Unit, the second AH-1S unit. This 2d Anti-tank Helicopter Unit will be formed at Camp Hachinohe in Aomori Prefecture.

Deployment of anti-tank helicopter units is proceeding from the north, founded on the basic strategy of "northern emphasis." The 1st Anti-tank Helicopter Unit was newly formed and inaugurated at Camp Obihiro in Hokkaido at the end of fiscal 1985. At the outset, the number of aircraft was not complete and it was formed for the time being with half the number, but formation was completed during fiscal 1986.

The authorized number for formation of an anti-tank helicopter unit is 16 AH-1S's, 4 OH-6J's and about 200 men. In addition to the unit headquarters, it is composed of a unit attached to headquarters and a flight squadron.

The 2d Anti-tank Helicopter Unit was born in fiscal 1987 as the second of these units. For the time being, it will start this fiscal year with a half formation and formation will be completed over a 2-year period. Thereafter, an anti-tank helicopter unit will be formed in 2 years with a base of one unit. The third AH unit will be newly formed and inaugurated under the command of the Middle Army in fiscal 1989.

In the Mid-term Defense Buildup Plan, the GSDF has scheduled the procurement of 43 AH-1S aircraft. They would like to form 4 and 1/2 anti-tank helicopter units with a total of 73 aircraft, including the 30 aircraft procurement portion up to the 1984 Mid-term Operations Plan. The GSDF now is off to a new start in the area of "air combat."

Another focus of GSDF aviation is the CH-47J transport helicopter. Two aircraft have been acquired up to the end of fiscal 1986 and training of skeleton personnel will begin soon in the new fiscal year at the Akeno Aviation School.

The acquisition of an additional three aircraft was scheduled by the end of fiscal 1987, but only one aircraft will be deployed to the 1st Helicopter Brigade. This CH-47J has a fully equipped weight about 2.3 times (50,000 pounds), an engine output about 2.5 times (7,500 horsepower), and maximum speed of about 1.2 times (160 knots) compared to that of the V-107A. Transport capability is 55 men (V-107A is 26 men), and it has a strong airframe markedly superior to the V-107.

The GSDF, MSDF, and ASDF are now greeting a great period of change in the aircraft they are furnished. It can be said that steady development is being accomplished respectively, embracing a noteworthy main theme. Taken from a wide viewpoint, it is forecast that fiscal 1987 will be an important year to be described as epoch making in all sorts of ways in self-defense force aviation.

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REORGANIZATION OF GROUND SELF DEFENSE FORCE DIVISIONS SEEN

Tokyo GUNJI KENKYU in Japanese May 87 pp 24-31

[Article by Military Analyst Tetsuo Kawamoto]

[Excerpts] First Division Reorganization In 26 Years

A division modernization project was approved in the fiscal 1987 budget draft with measures to improve and modernize ground fighting power as one of the main underpinnings. This fiscal year, the 2nd Division and 7th Division are being modernized. There was a small-scale "scrap and build" reorganization in fiscal 1980, with the 7th Division made into an armored division, the 8th Division restructured into an A Division (9,000-men division, 4 infantry regiments), the 3rd Division restructured into a B Division (7,000-men division, 3 infantry regiments), and the new organization of the 2d Combined Brigade. However, there has been no overall restructuring of divisions since the division reorganization of fiscal 1961.

The structure of divisions, which are the strategic unit, has inevitably changed along with modernization of equipment and changes in tactical concepts.

It is somewhat strange that the Ground Self Defense Forces has had the same division structure for close to 30 years. The current division structure was the result of using the pentamic form as a model, sweeping away all the numerous logistic units, and forcing the 6 regional units and 4 combined brigades into 13 divisions. As a result, there has been much dissatisfaction that "fighting was impossible" since the outset of the division reorganization. Thirteen divisions have had to be maintained within the limit of 180,000 men. Moreover, with the new organization of the 1st Combined Brigade accompanying the return of Okinawa and the establishment of the 2nd Combined Brigade for the forlorn Shikoku, modernization of the division had not begun at all.

Changes in tactical concepts and the fighting conditions of an anticipated future war are completely unknown to outsiders, but some people are keeping tabs on equipment modernization. The division artillery regiments of the Northern Army all are uniform with 155mm self-propelled howitzers. Regiments such as the 2nd Artillery Regiment can be called a lineup that is first-rank

in the world for division artillery with 11 companies, 12 130mm twin-mounted rockets on 55 guns, if they have enough ammunition. The brand new FH70 is being introduced even in the interior division artillery regiments. They have not just howitzers, but superior equipment not even imagined 30 years ago, such as domestically manufactured tanks and anti-tank missiles.

The modernization of division structure is necessary just from this modernization of equipment alone. Also, since the Ground Self Defense Force 180,000 men limit has remained set, a rather drastic shift in emphasis is required. At the same time holes will be created somewhere and problems will occur in how to cover them. Thus, in the Mid-term Defense Buildup Plan that was decided in September 1985, modernization and diverse organization of divisions were proposed with upgrading of capability to deal with landings as the main underpinning.

The modernization project for the 2nd Division and 7th Division that was approved in the budget draft this fiscal year is an epoch which will be the foothold for a continued series of division modernizations under this Mid-term Defense Buildup Plan. Modernization of the 5th Division and 11th Division are scheduled for next fiscal year, completing the modernization of the four divisions in the Northern Army. Modernization of the interior divisions will be in 1989 and thereafter.

Modernization of the 2nd Division

A Front-line Division

The 2nd Division, in charge of the northern part of Hokkaido, has the oldest history among the four Northern Army divisions, as the division number indicates.

North Hokkaido is closest to Sakhalin, probably the base of Soviet operations. The Soya Straits, one of the three sea straits, also is within the 2nd Division district. Consequently, it is thought that the 2nd Division will be first to face attack, whether by limited occupation of the shoulders of the strait in order to push through the three straits or by a hole-punching attack planned for occupying the whole region of Hokkaido. Therefore, new equipment is sent on a priority basis to the 2nd Division and the adequacy rate also is handled specially. Also, this division modernization has started with the 2nd Division.

Currently, the 2nd Division has its division headquarters in Asahigawa, and as its nucleus the 3rd, 9th, 25th, and 26th Infantry Regiments, the 2nd Artillery Regiment, and 2nd Tank Battalion. In its district there are five camps: Asahigawa (Division Headquarters, 9th Infantry Regiment, and 2nd Artillery Regiment main force, 2nd Engineer Battalion, 2nd Communications Battalion), Nayoro (3rd Infantry Regiment, 2nd Artillery Regiment - 2 battalions, 2nd Reconnaissance Unit, 4th Anti-aircraft Artillery Group, 301st District Engineer Unit), Rumoi (26th Infantry Regiment), Engaru (25th Infantry Regiment), and Kami Furano (2nd Tank Battalion, 2nd Anti-tank Unit, 4th Artillery Group, and 308th District Engineer Unit) and four detachments: Chikafumidai (Fuel Depot, Ammunition Depot), Wakkai (301st Coastal Patrol Unit), Tada (Ammunition

Depot), and Rebun (301st Coastal Patrol Unit Detachment). The 4th Anti-aircraft Artillery Group and the 4th Artillery Group are not under the command of the 2nd Division; they are under the direct command of the Northern Army but in fact, are units supporting the 2nd Division.

Motorizing and Armoring

The motorization and armoring of infantry regiments are at the heart of the division modernization project. In the budget this fiscal year, three regiments, the 9th Infantry Regiment of Asahigawa, the 25th Infantry Regiment of Engaru, and the 26th Infantry Regiment of Rumoi, will be motorized, and the 3rd Infantry Regiment of Nayoro will be armored. To withstand the first attack, the armoring of Nayoro at the center and northern-most tip to defend National Highway No. 40 which is the major approach route, and the motorizing of Engaru on the left flank, Rumoi on the right flank, and Asahigawa in reserve is an appropriate disposition. The armoring of Asahigawa would be desirable also, but so far they have not been able to attend to it. However, if the impression that there is one more regiment to armor is not left, there is a great possibility that it will become outdated in another 10 years.

In the specifics of motorizing, it is a great mistake to call to mind the motorized sniper divisions of the Soviet Union. In short, it is a posture in which 10 large trucks are added to each regiment and the regiment obtains mobility with independent vehicles. The specifics of armoring are to have 62 armored personnel carriers (APC) centering on the 73 Model APC as intrinsic equipment of a regiment and the main power of the regiment would be its mobility capability with APC. If the mechanized infantry combat vehicle (MICV) currently under development is perfected, it will be scheduled to replace the APC gradually.

From a world view, it has been a general trend to go from infantry APC to MICV. The Ground Self Defense Force in contrast has made only two regiments APC, the 11th Infantry Regiment of the 7th Division and a regiment which receives the support of the 101st armored transport unit. The other 44 regiments are not even motorized. One regiment among the four regiments of an A Division barely can have vehicle mobility with the support of division transport units. The other three regiments have motorized heavy trench mortar companies, recoilless gun platoons within a regiment company, and trench mortar platoons. The main force rifle platoons only have their own feet as a method of mobility.

It is a fact that tanks are the nucleus of a land war. That tendency is particularly strong in Hokkaido, but infantry accompaniment is indispensable for it to demonstrate fully its power. For that reason, in various nations at least one armored vehicle is produced and outfitted for every tank. In Japan, there is an armored vehicle for every five tanks. Procurement of the main force 73 Model APC began in fiscal 1973 and so far 180 have been produced. During hard times, only six vehicles were authorized for four consecutive years. The price for a 73 Model APC in contracts this fiscal year is 120 million yen each. It is not much of a comparison, but one M113 APC is about 38 million yen. In short, it is too expensive and therefore the number has been limited. Also, it has slid into the vicious circle that because of

small quantity, it has become expensive. In order to break this vicious circle, one method probably would be the development of an APC cheaper in price and not requiring maintenance costs, even if performance is somewhat lowered. It is not known whether or not the Model 73 APC is the crowning APC in the world, but there is no dispute in the point of luxuriousness. Since war ultimately is a number of victories or defeats, this probably will become a serious issue in the case of the new MICV.

Strengthening of Tank Battalions

A plan was proposed in the Mid-term Defense Buildup Plan that one tank company would be taken away from tank battalions of the 6th Division and those further south, and these would be held in the Northern Army. Attention was drawn to what form the tank units of the Northern Army would take. That shape became clear with the addition of the 2nd Tank Battalion that was approved in the budget draft this fiscal year.

Tank battalions of A divisions up to now have consisted of a main company equipped with 4 tanks and four tank companies equipped with 14 tanks for a total of 60 tanks. A tank company has the company headquarters equipped with 2 tanks and three tank platoons equipped with 4 tanks. With this addition, there will be four platoons in these tank companies. It not known what operational formation they will take but from the numbers, a tank platoon could be assigned to each of the four infantry companies if one tank company is assigned to each infantry regiment to form a combat group.

By simple calculation, the authorized number of tanks in a strengthened tank battalion becomes 76, but it will be 74 since the main company has 2 tanks. It probably will be the largest tank battalion in the world and it will have the same number of tanks as the tank regiment of the 7th Division. There is some unease about whether a battalion commander can command 74 tanks, but tank group operations like those of the 7th Division which specialize in mobile attacks are not considered. Since the operation is different and the degree of completeness of support systems such as servicing is different, it has not be raised to regiment status as stated by some and the title of 2nd Tank Battalion follows suit as is.

In the plan, 140 tanks will be brought into the Northern Army from the 6th Division and those farther south. With these 140 tanks, there will be 100 tanks remaining if the 2nd Tank Battalion is added this fiscal year and the 5th Tank Battalion and 11th Tank Battalion next fiscal year. These will be allocated to the addition of the 1st Tank Group.

Independence of Anti-aircraft Battalion

The lack of battlefield air defense capability commonly is pointed out. Except for the 7th Division, air defense of divisions up to now has been assigned to the 6th Battalion of the artillery regiment, but those ranks have been meager. Equipment consists of 8 sets of 35mm L-90 machineguns and 12 self-propelled anti-aircraft machineguns, but no division exists with these complete. The L-90 is an effective weapon against position air defense, but the art of air defense accompanying a unit is difficult. The self-propelled

anti-aircraft machineguns have a good reputation, but the M-15 which is a mixed loading of a 37mm gun and 12.7mm machinegun on an M-3 halftrack belongs to the World War II era. There is also the twin-mounted 40mm gun M-42, but this also is a period piece and there are only 8 of them.

This sad situation is probably the result of money and personnel being eaten up by HAWK units. Recently, the procurement of the 81 Model short-range SAM also has gotten on track and moreover, this fiscal year AWX will appear. It can be said that the role of battlefield air defense finally has been completed by these. To respond to this action, as a policy of division modernization, the 6th Battalion of the 2nd Artillery Regiment will become independent and form the 2nd Anti-aircraft Battalion under direct division command.

The future form of the anti-aircraft battalion probably will be an AWX company combining 2 sets of 81 Model short-range SAM (1 set consists of 1 firing control device, 2 four-mounted launchers, and 16 missiles) and several regiment combat groups. The price of AWX is very high, however. The first procurement this fiscal year will be 6.5 billion yen for four. There is great doubt that the number will be completed with this.

New Organization of Chemical Protection and Electronic Surveillance Platoons

As another modernization policy, a chemical protection platoon will be newly formed within units attached to division headquarters. The Soviet forces have chemical protection battalions in divisions and companies in regiments. U.S. military divisions also have NBC companies for the most part. Various nations seriously view NBC protection in this way but in the Ground Self Defense Force up to now there has only been one unit, the 101st Chemical Protection Unit. There are no units in charge of this field either in the armies or in the divisions. However, each person carries a gas mask and there is NBC protection gear in only a very few armored vehicles.

Although on a small scale, the new formation of a chemical protection unit within a division is a big advance. If chemical departments were to be restored in army headquarters, it would have a good effect on increasing concern for NBC protection. At any rate, since it is a platoon within an attached unit, large scale contamination removal cannot be done. They will probably be in charge of grasping the contamination situation with one or two vehicles, marking off the contamination zone, and conducting chemical protection instruction and support for each unit.

As another modernization policy, an electronic surveillance platoon will be newly formed into the 2nd Reconnaissance Unit. Details are unknown but it is thought to be a unit that will intercept and detect enemy radio communications and anti-gun and anti-mortar radar activity, range those positions, and investigate troop strength and organization. In the future, it probably also will be charged with the duty of aggressively jamming enemy electronic activity. This will give it a new capability that has not existed in reconnaissance units up to now.

New Formation of Logistics Support Regiments

None of the policies mentioned above brings an increase in personnel. So, somewhere there must be rationalization and a decrease in personnel. Also, along with plans for smoothing logistics support, the 2nd Logistics Support Regiment will be newly formed, combining a weapons unit, supply unit, transport unit, and medical unit. This measure also was conducted when the 7th Division was armored, but it became a weapons battalion because the 7th Division was equipped with over 700 track-type vehicles and there were many servicing requirements. In the case of the 2nd Division, it will be kept to a weapons unit since there are not that many servicing requirements.

The decrease in personnel made possible by this rationalization offsets the personnel increases of the other modernization policies, holding it to an overall increase of 90 men. It should be highly praised as the result of tearful effort. However, since logistics support and the divisions overall had no depth even without this, it probably would not be wise to compress the numerous logistics units any further. Whatever the case, ultimately there are great problems in the point that it is only possible by scrap and build. The bottleneck is the limit of 180,000 men. To modernize, they must be resigned to a corresponding increase in personnel and secure it.

Modernization of 7th Division

Mobile operation units were determined in the Outline of the Defense Plan and the 7th Division, the pride and joy of the Northern Army, reached the level of world power divisions with armoring and reorganization in fiscal 1980. Its ranks of 232 tanks, 336 APC, and 40 155mm self-propelled guns, scraped together by concentrating all their effort, is quite a thing. Consequently, in the division modernization this year there will be no more than partial readjustment and additions through introduction of new equipment.

First, a chemical protection platoon will be newly formed within units assigned to division headquarters, as with the 2nd Division.

A new roadblock operations vehicle will be introduced as new equipment in the 7th Engineering Battalion, and it appears that its structure also will be partially readjusted. This roadblock operations vehicle is a remodeled large truck which can use six kinds of attachments. It is engineering equipment which can swiftly construct barriers on paved roads.

Radio carrier-frequency terminal equipment No. 2 will be added to the 7th Communications Battalion to deal with the increase in communications volume.

Eight reconnaissance patrol vehicles will be introduced as new equipment in the 7th Reconnaissance Unit. With these it will have a posture in which it can demonstrate the character of armored reconnaissance in which full power reconnaissance is possible.

Summary of New Division

As stated before, division modernization is scheduled for the 5th Division and 11th Division next fiscal year and for the 6th Division and those further south after that. The details of what they will be like are indicated in the Mid-term Defense Buildup Plan. Viewed collectively again, it is as follows:

Northern Army 9,000-men Division

armored	infantry	regiment	x	1
motorized	infantry	regiments	x	3
tank	battalion (platoon x 16),	tanks	x	74
anti-tank unit, 79 Model Heavy MAT	x 16 sets			

The inherent anti-tank capability of these infantry regiments will be strengthened. For the present, half of the 106mm recoilless guns with which infantry companies are currently equipped will be replaced with the new medium MAT. The first procurement of medium MAT this fiscal year will be for two divisions.

If the example of the 2nd Division is applied to the 11th Division, it will be as follows: the armoring of 10th Infantry Regiment at Takikawa, motorizing of the 18th Infantry Regiment at Makomanai, 28th Infantry Regiment at Hakodate, and 29th Infantry Regiment at Kutchan seems natural.

Since the frontal area charged to the 5th Division is wide and on the east side of Hokkaido where the operation of large armored units is easy, it was thought that the current 7,000-men B division possibly would be raised to a 9,000-men division, but it appears it will remain as a B Division. This 7,000-men division in the Northern Army consists of 1 armored infantry regiment, 2 motorized infantry regiments, a tank battalion with 12 platoons and 56 tanks, and an anti-tank unit with 12 sets of 79 Model Heavy MAT. It is difficult to guess which of the 5th Division infantry regiments will be armored. It appears that the 6th Infantry Regiment at Bihoro will be armored, but there are also views that it will be the 27th Infantry Regiment at Kushiro because of its relationship to the maneuver grounds, or the standard-bearer 4th Infantry Regiment at Obihiro. Which of these it is to be will become clear next fiscal year.

The 9th Division at Aomori is a 7,000-men division like those at present, and the 6th Division and those further south 9,000-men divisions consist of the following:

motorized regiments x 4
tank battalion (company x 3), tanks x 44
anti-tank unit, 79 Model Heavy MAT x 16 sets, Medium MAT x 16 sets.

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ECONOMIC

NEW JAPANESE AMADA PLANT IN FRANCE, TECHNICAL CENTER IN FRG

Amada Technical Center

Duesseldorf HANDELSBLATT in German 25 May 87 p 1

[Article by "ga": "Nearer to the Customers"]

[Text] Tokyo, 23/24 May--The Amada Company, the leading Japanese manufacturer of metal-working machinery, is placing its hopes in a division of operations within this group on an international scale so as to make it unnecessary to expand further its exports from Japan. As company head Mitsuaki Amada explained to the HANDELSBLATT, within the framework of this concept even the delivery of machinery from the production centers in foreign countries to Japan should then be possible.

This year, the dominant focus of its commitment in Europe is the commencement of production of punch presses in France. The entire European market is to be supplied from this site. For the time being a production outfit in Germany is not being considered. Instead, the sales center in the FRG is to be expanded into a technical center.

Punch-press Production in France

Duesseldorf HANDELSBLATT in German 25 May 87 p 13

[Article by Andreas Gadow: "New Punch Press Production in France"]

[Text] "This year, the commencement of production of punch machines in France is the focus of our commitment in Europe," declares Mitsuaki Amada, president of the Amada Company, the leading Japanese manufacturer of metal processing machinery. Back in the 1970's this company began on the establishment of a worldwide network of centers for sales, production, and development. In Germany, the sales center is to be expanded into a technical center.

In 1951, Mitsuaki Amada (born in 1932) joined as a 19-year-old the company that was founded by his brother Isamu after the end of the war. The original business of this company was the repairing of machinery. Amada has been a member of the management since 1963, and since 1983 he has headed the group of firms as the chief executive (president).

In the mid-1950's the company then itself undertook the production of band saw machinery and metal working machinery. Moreover Amada developed an independent organizational and marketing philosophy, which allowed for the first time the expansion of the company and made the group as a whole into the leading manufacturer of metal processing machinery in Japan.

For this company, fiscal year 1986/87 (31 March) was marked by a distinct worsening in sales and profits, because of the extreme upward evaluation of the yen and investment weakness in important customer sectors such as the automobile and electrical industry. While sales declined by just under 17 percent to 97.2 billion yen (about DM 1.2 billion), and export proceeds declined by 14 percent to 20.2 billion yen (about DM 250 million), there was a halving of the ordinary earnings (profit before extraordinary returns and taxes) to merely 7.9 billion yen (about DM 95 million). Just in the previous fiscal year a decline in earnings of just under 20 percent had to be absorbed.

However, in this connection Mitsuaki Amada points to the important contribution made by the division of sheet-metal working machinery, where the decline in sales of only just under 10 percent was below average, since the company is profiting from the healthy demand in domestic building construction; in exports it even proved possible to achieve a definite plus amounting to a good 7 percent.

A distinguishing feature of the organization of the group, which now includes 20 Japanese and 17 non-Japanese firms, is its operating in separate product-specific and function-specific business units: The production and selling of the various machines and systems as well as the computers for controlling the manufacturing process and the programs required for these are located in independent firms each time. This applies also to the production firms of Sonoike and Wasino.

However, the Amada Company Ltd in Ishida that functions as the holding company of the Amada group is centrally responsible for the overall research and development activities. Thus, under its direct control is the Central Research Institute and the Material Research Institute of the group, in which working teams composed of employees from individual group firms are always formed for separate projects having fixed deadlines.

Mitsuaki Amada mentions three reasons for this organizational structure: On the one hand, it has been possible to adapt the working conditions and salary structures in the separate units flexibly to the respective requirements. Moreover, the decentralized organization permits a more flexible giving of attention to market developments. But finally, the creation of separate but also interrelating firms leads to a business awareness in the respective management that would not be brought about if it merely functioned as a factory management in a large enterprise. This structure has proved its worth especially in the implementation of rationalization projects, Amada emphasizes.

Consultation, Material Testing Runs

Central to the marketing conception of the group is the so-called "Amada Industrial Machinery Plaza," as a forum for dialogue with customers and interested parties. On an exhibition area of just under 10,000 square meters, which is open 3 days out of the week including Saturday, about 200 different types of machinery of the group firms are presented. Here, interested parties can be given advice and at the same time can carry out test runs with their own material in order to determine, in talking with technicians of the company, the set of machines or the system suitable for their needs, inclusive of the requisite control units and programs. Therefore Amada views the plaza not merely as a sales site but also as a front line of the development activities of the group, with institutionalized feedback to product development. Finally, this center is complemented by its own education and training facility for technicians of the customer firms.

Moreover, in addition to a sales organization the company has established its own production facilities in the United States and Europe. In the United States, numerically controlled turret presses inclusive of the tools required for these are being manufactured, as well as laser cutting machines. In Europe, the Amada U.K., Ltd. is the location for the production of tools for CNC turret punch presses and the Amada Italia S.r.L. is the location for the production of bands for band-saw machines.

Moreover, in June the production of numerically controlled punch presses for the entire European market is to now begin at the Amada Works in France. Mitsuaki Amada stresses on this point that this will be a purely European production that will take the place of exports from Japan, since also the components and the control units will be obtained from other production centers of the group in Austria and Italy. To this end, the Japanese company had completely taken over the firm of Promecam Sisson Lehman S.A. (now: Amada S.A.) at the end of last year.

According to Mitsuaki Amada, the sales center in the FRG at the Amada GmbH, Haan, is to gradually be expanded into a technical center, in which potential customers can have tests run and where the requisite training for the future technical personnel of the customers can be carried out. But Amada declares that a production site in the FRG is not under consideration at present.

These activities are being supported by centers for research and development work in America and Europe: In the United States, since the beginning of the 1980's at the Amada Engineering & Service Co., Inc., and in Europe since 1985 at the Prima Industrie S.p.A., in which the Japanese company holds a share of 49 percent. Initial results of this Japanese-Italian cooperation are on hand, and it has already proved possible to integrate these results into systems of the company, declares Mitsuaki Amada.

Division of Operations Instead of Exports

In addition to this direct international commitment, there is technical and sales-related cooperation with Brown & Sharpe Mfg. Co. (United States) in connection with surface grinding machines, with Digital Electronic Automation

(Italy) in three-dimensional mensuration engineering, and with Charmilles Technologies S.A. (Switzerland) in electronic discharging machines.

This international division of labor within the group is to be expanded in the future, so that thereupon even the delivery of machines from the foreign production centers to Japan will be possible: "A further expansion of exports from Japan is not our aim," stresses Amada.

But the forecast of the company is that the decline in sales of the two previous years will continue also in the current fiscal year of 1987/88. At the end of March, the order backlog of 12.4 billion yen was a good 13 percent below the corresponding value of the preceding year. For the entire fiscal year the company is now anticipating another sales decline amounting to a good 3 percent, to 94 billion yen.

However, the ordinary earnings should show improvement again by about 10 percent, to a figure of 8.7 billion yen, due to a closer organizational association between the divisions of sales and development. To this end, declares Mitsuaki Amada, at the beginning of this month five business units were formed that are endowed with greater powers for the product lines of band-saw machinery, sheet-metal working machines, sheet-metal working systems, presses, and plastics processing machinery, in which a close intermeshing of the design engineers in the sales activity is to be done for the purposes of strengthening the company's market position.

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CSO: 3698/468

STUDY ON DYNAMICS OF FOREIGN EXCHANGE RATES

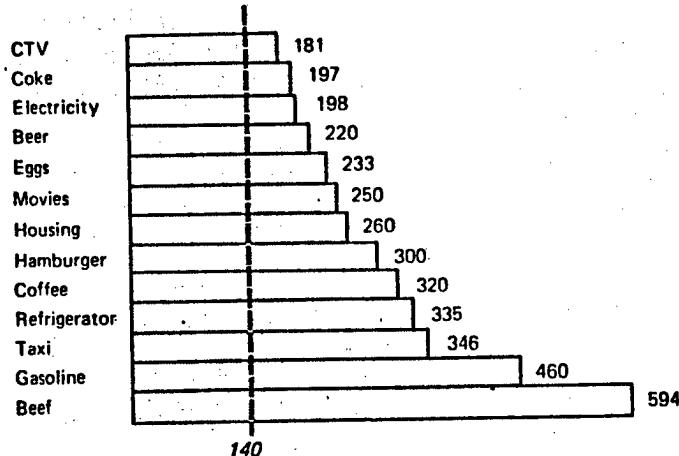
Tokyo THE JAPAN TIMES in English 29 Jul 87 pp 7-9

[Article by Kenichi Ohmae]

[Text]

Exhibit 1**PURCHASING POWER**

Y/S: 1986



Since Japan liberalized its foreign exchange (FX) laws in 1980, the yen has joined the Western basket of currency trading. What this means is that about two-thirds of the world's economy is now rather freely interlinked through currency trading. Traditional economic policies based on a closed-country model, such as Keynesians and the monetarists, are

being seriously challenged. For example, the existing models cannot explain simple and now not-so-uncommon phenomena, such as these:

- Employment is created in a Korea when the American economy picks up.
- Money appears in the U.S. overnight when the Japanese money supply is too much.
- Economy recovers while unemployment goes up, due to robots taking over human jobs.
- Currency fluctuates more than 40 percent a year when

the fundamentals of the two economies — Japan and the U.S. — really haven't changed much.

We are trying to develop a model to explain the globally interlinked economy. At this stage, we think we have an interesting model for the currency portion of the interlinked economy, which merits critical appraisal from scholars and students of currency trading. Let me describe our basic understanding of the current situation, the assumptions in constructing our model, and the results of our initial testing.

Basic understanding of foreign exchange

A survey conducted by central banks at the end of March 1986 indicates that the trading volume of FX in the three key markets of London, New York and Tokyo was in the order of \$200 billion a day. London was the largest of the three at \$90 billion, followed by N.Y. at \$50-58 and Tokyo at \$48-50 billion.

Foreign exchange trading, along with futures and options, was designed to assist in smoothing international transactions such as trade

Exhibit 2

PRICE INDEX

May 1985 = 100

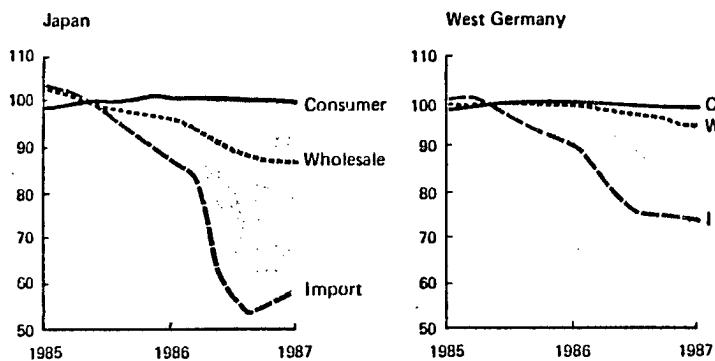
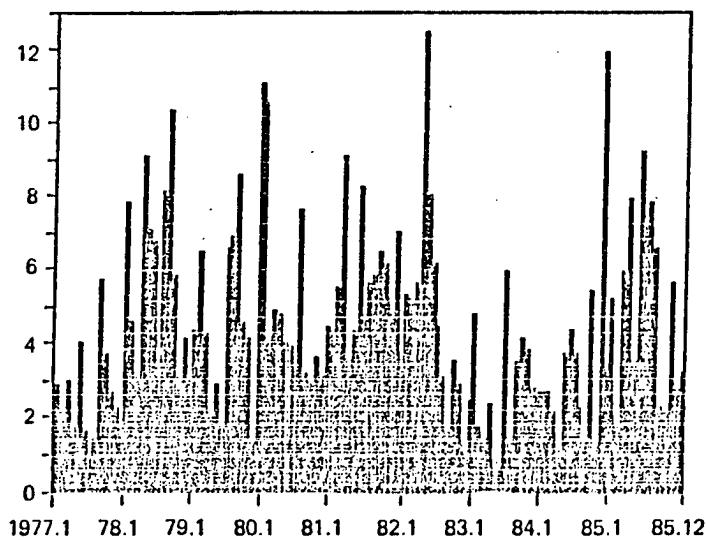


Exhibit 3

MONTHLY RATE OF CHANGE — YEN VS. DOLLAR

Highest minus lowest price in a month as percent of the monthly average



and investment. Such activities amount, at the most, to only about \$20 billion daily amongst the U.S., Europe and Japan. It cannot possibly explain the current size of the FX market, which is 10 times larger than the volume of "real" transactions. What has happened is that the FX market has started to have its own *raison d'être*, and has developed unique behavioral patterns that must be treated with care and interpreted

with a new perspective. For example, the FX market has been proven to:

- *Dwarf government intervention.* Against the declining dollar, the Bank of Japan (BOJ) had injected some \$16 billion to arrest the dollar's free fall from March 19, 1986 through Jan. 29, 1987. During the two-and-a-half weeks at the beginning of this year, BOJ injected as much as \$8.5 billion to support the dollar, to no avail. The FX market has

become an empire of its own, or the Third Empire, which seems completely independent of the Group of Five or, for that matter, any government.

- *Not reflect "purchasing power."* As Exhibit 1 indicates, there is no major item which can justify the current exchange rate of ¥140 to the dollar. In fact, a more reasonable conversion rate is certainly above ¥180, in order to equalize the prices of day-to-day commodities.

There are several reasons for this seemingly perplexing issue. One, and the most obvious, is that the Japanese distribution system is much more extended and less efficient than that of the U.S. So, a Japanese-made camera can be purchased at a much lower price at the 47th Street Photo Shop in New York City than at Yodobashi Camera, a Tokyo discount store. A typical camera or color-TV is priced at four times its manufacturing cost. So, "purchasing power," which was believed to influence the currency exchange rate in equalizing prices, needs to be redefined using a product's cost to the importing decision maker.

International trade occurs based on the competitiveness of a product's delivered cost (i.e., manufacturing plus logistics cost), as opposed to sales price. In order for Japan to increase imports, as the dollar and other currencies gain relative advantage, distribution must be streamlined. The so-called price elasticity due to exchange rate change does not happen if the lower or higher price is not passed on to the real purchasing decision maker. For example, if an American scientific instrument's delivered price is lowered as a result of a weaker dollar, it may gain a share of the market from its Japanese competitors, and the American export may climb up, showing clear signs

of elasticity. Likewise, if cotton oil became more competitive than sesame seeds and/or coconut oil, the U.S.-made cotton oil might displace other types of oil as sources, e.g., for making salad oil. So, while the end user price may not go down, as the middleman "pockets" the additional profit, elasticity is observed as the exchange rate changes. However, in most cases, a simple reduction in the import price at the cost-insurance-and-freight (CIF) or free-on-board (FOB) levels does not result in increased imports, as little is passed on to the consumers. Indeed, consumers of both West Germany and Japan have not really benefited from the decrease in import prices as their currencies have strengthened, as shown in Exhibit 2. Thus, Japanese imports have not increased, despite the stronger yen.

• *Yield much better performance than other financial instruments available in the real world.* Exhibit 3 shows the monthly dollar/yen exchange rate fluctuation over the recent nine years. In all but two months over nine years, the FX market has fluctuated more than one percent in a month. In fact, the average move has been 4.5 percent per month, or 55 percent per year for a consistent winner in the FX market. Quite often, opportunities to make more than 6 percent per month appear (Exhibit 4). Similar high yield opportunities may exist in real estate, stocks, gold and, in the case of Japan, golf-club memberships. However, such capital gains are usually taxed to effectively halve the yield; but the FX market is unlimited and unregulated in size, frequency of exchange, gains/losses and taxes.

The FX market is unlimited and unregulated in size, gains/losses and taxes

What this means is that the FX market has become one of the largest investment instruments in itself, and is interchangeable with other instruments. At the root of this problem is the worldwide superliquidity problem. In Japan alone, some \$1.1 billion is generated daily from the private and corporate sectors to be invested. Since there are not many opportunities to substantively absorb such an amount of money in real consumption, the excess money ends up in the available instruments, or "buckets." For institutional investors, it does not make any difference in which buckets the money is put, so long as they are interchangeable and tradeable.

Tokyo's stock market has already absorbed as much water (i.e., money) as any logical mind can imagine, at a PER of 80. The real estate bucket also has been filled high, as real-estate prices in central Tokyo have risen three to five times in the last three years. It does not mean that the utility of real estate has grown threefold. It simply means that it has absorbed as much money as it can. The payback period of an average office building is now over 100 years. Such a phenomenon can only be understood with the expectation of continuing inflation in selected real-estate properties. The \$2-million membership fee for the Kasumigaseki Country Club is also reconcilable only when one discovers that these golf-club memberships are traded in Tokyo. Even in

Japan, the price of untradeable properties, such as real estate in remote and rural locations, is going down, indicating that tradability is the key prerequisite for qualifying as a bucket for cash overflow.

This new phenomenon suggests that several major changes are taking place, which would challenge the traditional understanding of economics.

Measuring inflation

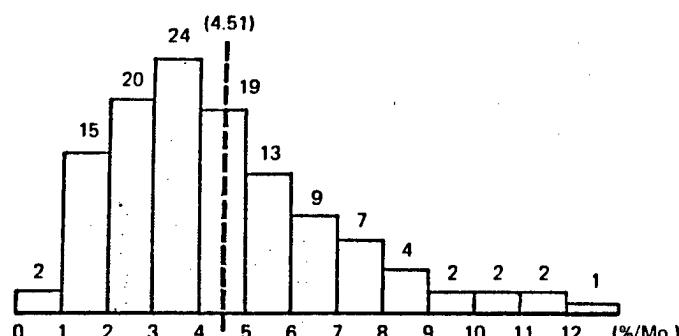
(1) The traditional measure of inflation, the use of consumer and wholesale price indices (CPI and WPI), is obsolete. Until recently, overliquidity resulted in inflation, as a result of excess money buying up inventory in expectation of higher prices. Today, in an era of worldwide oversupply, excess money is contained in tradeable buckets, and has not harmed the greater public by increasing inflation. This is because higher prices are certain to discourage demand. When supply is tightened, there is always a high probability of inflation. We are living with a zebra-like inflation today, where CPI and WPI are stable, but real estate and stock prices are sky high. In a way, the creation and discovery of these liquidity buckets, and the successful containment of excess money therein, have been the key ingredients in curbing inflation. Governments cannot be credited much with this success. Their sugar-coated monetary policies would have created unmanageable inflation across the board, were it not for the invention of the globally inter-linked buckets and the occasional "leaky" buckets which act as "black holes" (Exhibit 5).

(2) The world's money supply has gone beyond the control of any single government. Through interlinkage and the

Exhibit 4

DISTRIBUTION OF MONTHLY FLUCTUATION

Percent; Histogram of 120 months from Jan. '77 to Dec. '86

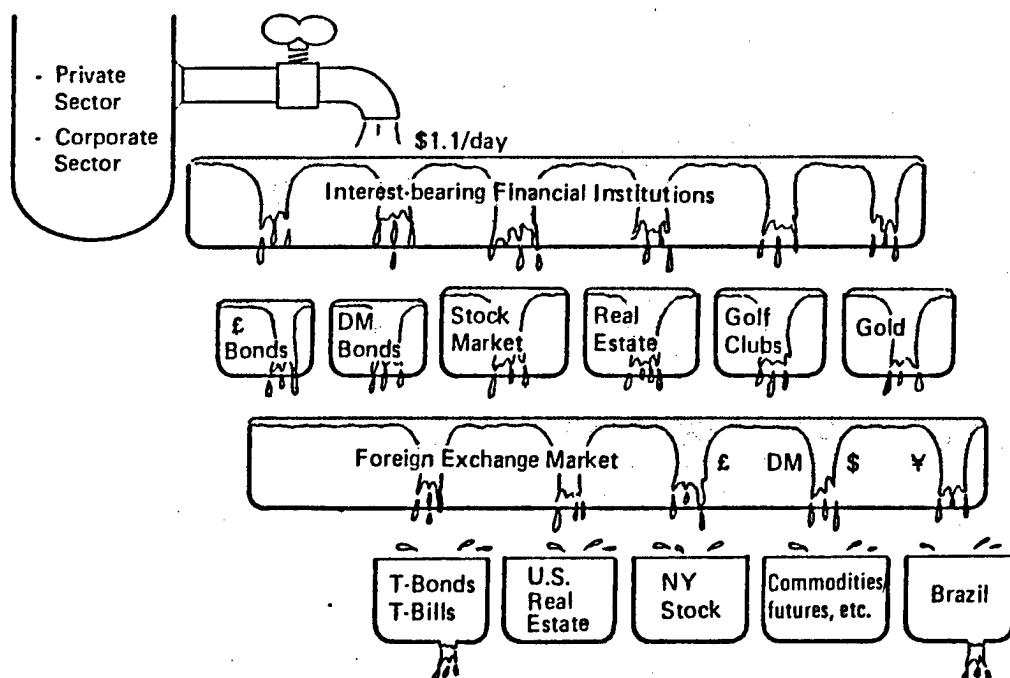


ments are bound to come back to the U.S. In the long term, the trade balance must equal the capital-account balance, unless the country goes "default" or "bankrupt."

(4) The notion of *interest* has become obsolete. Such attractive profit-making opportunities as speculative buckets lure financial institutions to stay within the non-interest-bearing FX market, stocks and real estates, rather than seeking investment opportunities in the "real" world. Lately, the American government has

Exhibit 5

THE BUCKETS OF SUPERLIQUIDITY AND INTERCHANGEABILITY



active FX empire, money now can travel across national borders in seconds. Even if the Bank of Japan tightens the money supply, a Japanese banker can borrow an impact loan instantaneously from abroad.

(3) Monetary interlinkage has created dollar-based markets in Japan and yen-based markets elsewhere. In fact,

the U.S. has created an opportunity to invite a \$50-billion investment at home by the Japanese through its trade deficit with Japan. The dollar-based trade deficit is nothing but an accounts receivable for the U.S., as greenbacks must eventually be used to buy something American. It may make a detour via OPEC or Brazil, but U.S. trade pay-

dollar by over 40 percent in a year. The FX empire's profit-making opportunities on the exchange itself could reach over 50 percent per year, making any interest-bearing instruments look rather boring.

- Be *ineffective in correcting the trade imbalance*. Despite the currency adjustment

of 40-50 percent, the U.S. trade deficit with Japan, and most countries in Europe, has not come down, at least in dollar terms. This suggests, on persistently asked Japan and West Germany to lower interest rates in order to keep the large spread with the U.S. Recently, as the U.S. interest rate has gone up, the spread has widened to something like 6 percent per year. That is still far too small to attract money from Japan or West Germany, whose currencies have appreciated against the one hand, that the use of the dollar to measure the imbalance is a futile effort when its value, relative to other currencies, is dwindling. It also suggests, on the other hand, that the exchange rate is a poor instrument by which to adjust the trade imbalance. Unlike the days of David Ricardo and Adam Smith, when internationally traded goods were primarily "commodities," the leading exporters today are much more specialized in manufacturing. The impact of the labor rate and raw materials is far less important today than in the past.

Industries tend to cluster to gain competitiveness and flourish as a whole, as in the case of aerospace in the U.S., chemicals in Germany, and cameras and consumer electronics in Japan. It takes decades to build up the infrastructure needed to excel in any industry worldwide. Once built, it again takes a long time to relocate. Currency rates are too temporary to affect corporate decisions to relocate. Currencies fluctuate. They seem to hit highs (or lows) every two years. Plants can't be moved around at this pace. As a result, higher prices may be passed on to the market, as in the case of German cars in the U.S., or cost is reduced significantly so as not to pass on the full impact of the exchange rate

fluctuation to the customer, as in the case of Japanese consumer electronics.

Short-term FX profits are more attractive than interest-paying instruments

It is a lot easier to absorb the impact of FX rate fluctuations within the existing industrial cluster, or cascade of old vendors/subcontractors, rather than relocate the plant to, say, the U.S., and start with brand-new vendors and subcontractors who are at the starting (high) point of the learning curve. These clusters have more resilience against changes in FX than a straight-forward comparison of wage rates under a new exchange rate might indicate. The Group of Five, here again, wrongly assumed that a correction in exchange rates would correct the problem of U.S. industrial competitiveness, and thereby rectify its huge trade imbalance.

• *Be extremely sensitive to macro-economic results and government officials' announcements.* If FX were reflective of the "fundamentals" of the economy, then such extreme moves, creating peaks and valleys, would not result. This is because economies — that of Japan or, for that matter, of the U.S. — do not fluctuate so vigorously, daily or monthly. As far as I can see, living in Tokyo, the Japanese economy is changing only slowly and consistently, and I believe the same is true with the American economy.

From a detailed analysis of the Reuter and the Telerate services (information terminals which almost all traders

worldwide rely on today), it is clear that the daily and even weekly rates are severely affected by American officials' public and implied statements. Exhibit 6 is an example of such an analysis of exchange-rate change, with indications of captions from the Telerate news as they appeared on the screen. Traders watch these screens not so much with a great knowledge of the world economy, but with curiosity as to how their fellow traders will interpret the same information. Reading the gravity of the mind of the traders is often more profitable than knowing the "fundamentals." It is thus the "announcement" of the fundamentals that drives the FX market, as opposed to the fundamentals themselves.

• *Change in a surge from one extreme to another.* For example, the yen-dollar rate changed from a low of 259 in February of 1985 to a high of 137 in May of 1987, or almost 50 percent — far from the notion of currency "adjustment." Though drastic, this was not the first time that the exchange rate had moved so significantly. In fact, the history of the pound-dollar relationship before and during the pre-Great Depression era is almost as "wild" as the recent dollar-yen relationship (Exhibit 7). In fact, one could conclude that the exchange rate does not "hesitate" at a certain level, but swings like a yo-yo in almost a two- to three-year cycle. The rate of change is particularly fast at the cycle's peak or bottom point (Exhibit 8).

Dramatic switches

The two countries' "fundamentals" obviously do not switch position so dramatically in such a short term. What has changed 180 degrees during recent time is the American government's fundamental belief. Several years ago, the U.S. wanted to

Exhibit 6

YEN-DOLLAR RATE MOVEMENT IN A DAY

Spot rate; March 31, 1987; Japan time

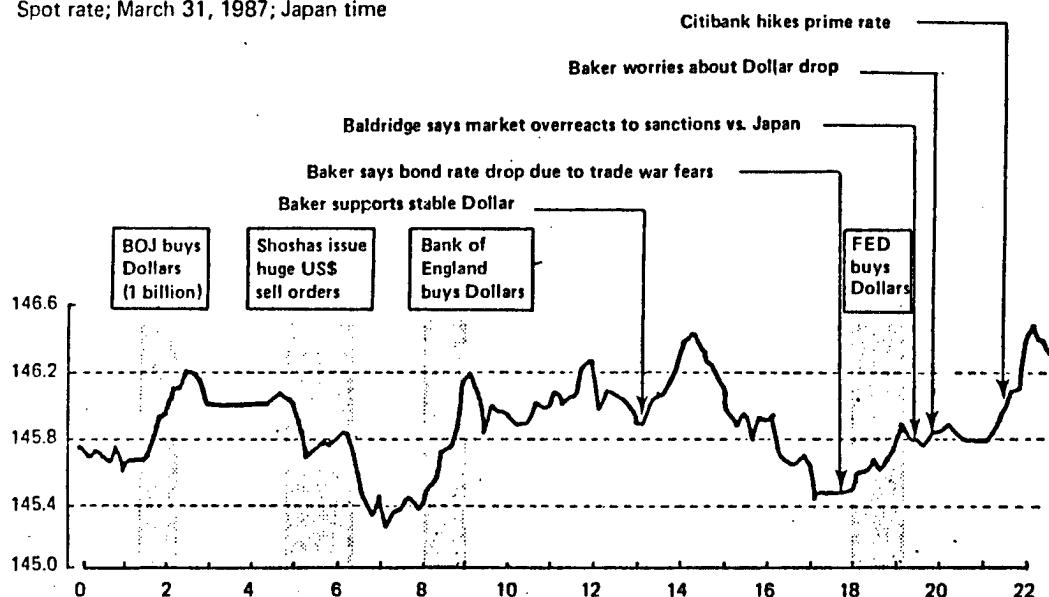
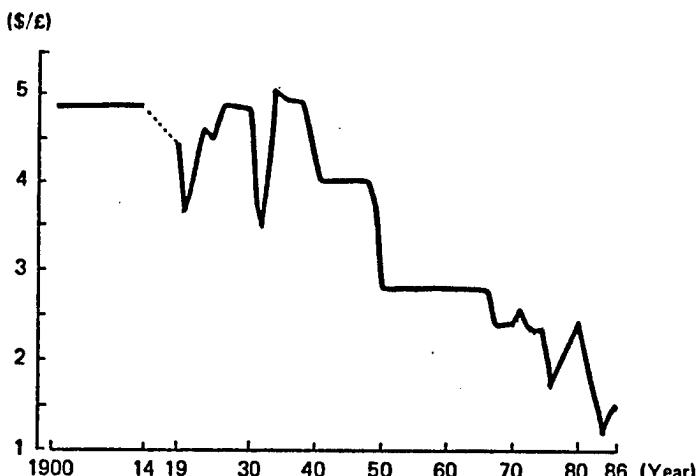


Exhibit 7

DOLLAR/POUND EXCHANGE RATE (1900—1986)



adopt a "strong dollar-strong America" policy known as "Reaganomics." This policy has resulted in the twin deficits of the government budget and foreign trade. The U.S. recipe was to deal with the latter first by reversing its

belief to that of "weak" dollars. The two countries' "fundamentals" have changed consistently over the decade at about 3 percent per annum, reflecting the differences in, for instance, productivity, rate of inflation and the in-

terest rate. This suggests that the right exchange rate would have been ¥170-180 to the dollar at the end of 1987, instead of the current range of ¥140.

As we analyze the currency market, we need to incorporate this force at work, which can be described as the "political paradigm." This paradigm is severely affected by American government officials, since they have voiced their beliefs, whatever they may be, more strongly and more aggressively than anybody else, particularly at turning points, or peaks and valleys. The Reuters of this world carry basically English information, and hence tend to over-reflect the American, rather than the Japanese or the German, points of view, particularly in the minds of money traders.

Reading FX changes

The paradigm is the weighted psychology of the traders reading as to which way the exchange rate goes. For ex-

ample, a lot of Japanese money traders know that ¥140/dollar is too high and personally feel that the rate should bounce back. However, they also know that their fellow traders around the world hear much more about U.S. Treasury Secretary Baker's point of view than that of our Finance Minister, Kiichi Miyazawa.

People dealing with consumer-packaged goods are normally sensitive to the "share of shelf space." They believe that if one can take up a larger area on the supermarket shelf for a given prod-

uct, it can get a higher share of the market. A similar attitude prevails in the FX market. A higher share of the screen, particularly with the Reuter News and Telerates, which over 90 percent of the currency traders around the world watch, tends to dominate the mind share of the traders, hence impacting substantially on the exchange rate.

Assumptions in currency model

From these observations, we can construct a set of assumptions about the currency market. For the sake of simplicity and clarity, I will use the dollar-yen relationship and the Japan-U.S. economies as key drivers. This does not mean that such is the case in the real world. But I do believe that the simplified model is a useful first step in constructing a mathematical model to explain, and hopefully predict, the unusual behaviors of the existing currency market. I have identified four fundamental forces at work which influence collectively to come up with one number, i.e., the currency exchange rate:

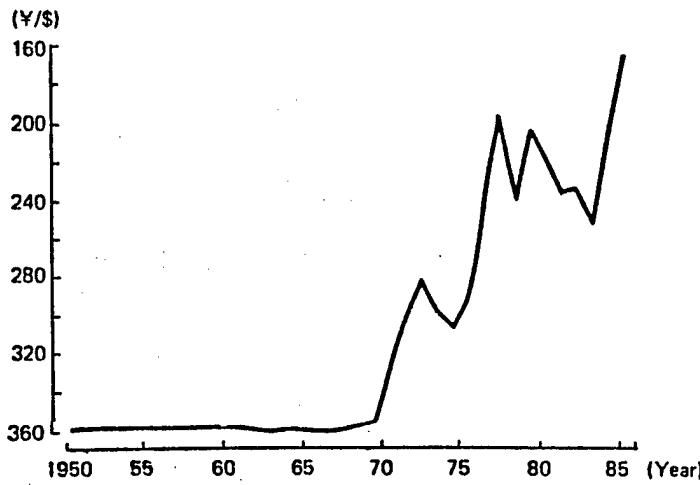
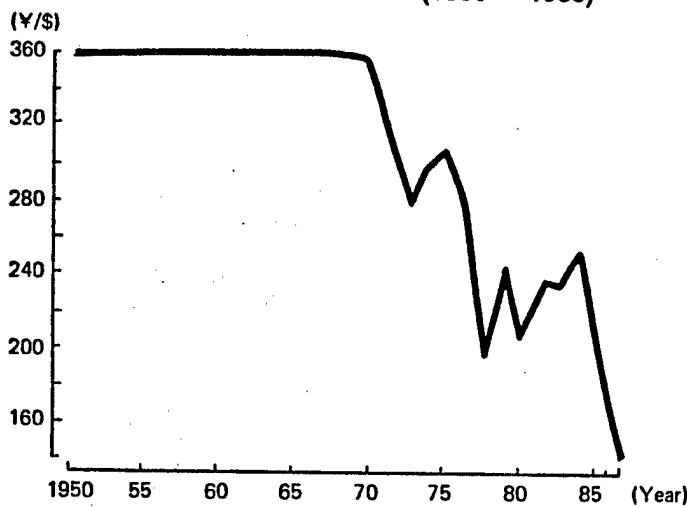
1. Trading power for goods transfer
2. Financial fundamentals for capital transfer
3. Political paradigms or commonly-held beliefs
4. Money traders' desire to make profits

The so-called "fundamentals" included such things as relative productivity gains and interest rates. I have tried to separate the factors affecting the competitiveness of the goods, such as productivity, from others which affect the flow of money in "financial fundamentals," and have included them in "trading power." In this fashion, we can more clearly understand the impact of the currency exchange rate on trade, and the flow of capital investment as a separate phenomenon. Let me explain each of these forces in more detail:

1. If, for example, color TV's delivered cost equilibrates between the U.S. and Japan at ¥140 to the dollar, automobiles at ¥180, scientific instruments at ¥200 and

Exhibit 8

YEN/DOLLAR EXCHANGE RATE (1950 — 1986)



beef at ¥400, the exchange rate is set as the weighted average of equilibrium costs of aggregate tradeable goods. Since not every tradeable industry will try aggressively to export, however, some dominant products will act as standards for the rate setting. Automobiles from Japan, and lumber and wheat from the U.S., then, may over-represent the process of exchange rate setting. Before Japan and the U.S. exchanged a lot of capital flow, this *relative trading power* was the dominant factor in setting the exchange rate. In the long term, the currency exchange rate is predominantly influenced by the relative competitiveness of manufactured goods.

However, productivity improvement is a function of the industry and capital intensity, and it is difficult to "weight" all industries. So, we have tested many relative indices to examine the long-term fit with the yen/dollar exchange rate, and found the wholesale price index to have the best correlation. If productivity gain is high, one can assume that the manufacturers do not have to pass the price increase to the end user, hence WPI may stay relatively flat. Exhibit 9 shows the correlation between the real currency exchange rate and the trading power adjusted for the relative change in WPI since 1973. We have pegged the latter at ¥265 to the dollar as 1973 was the year just before the energy crisis, when the two countries' trade was balanced, and also it corresponds to the period right beyond the initial adjustment phase after the float started.

This long-term trendline indicates that the trading-power-based exchange rate would still be around ¥180-200 at the beginning of 1987. According to this theory of relative trading power, the potential for a certain exchange rate will have a reverse Gaussian dis-

tribution. Since the exchange rate is singularly set, any products which are not at the stable saddle point, or the bottom of this potential distribution, will be either too artificially competitive (left of center, as viewed from Japan to export to the U.S.), or too handicapped (right of center). For example, when automobiles became the dominant export item from Japan, textiles suffered, but chips had a lot of breathing room. Japanese chip producers did not take this margin as a heaven-sent profit, but instead used it to reduce their prices in the U.S., only to be accused of dumping. The dots on Exhibit 10 are illustrative of the right exchange rate for a given product in exporting to the U.S. from Japan. The white circles schematically indicate the right rate for U.S. exports to Japan.

2. A second strong factor affecting the exchange rate is the *financial fundamentals*. Fundamentals usually drive money in one direction or another, as opposed to the

Financial fundamentals drive money in one direction or another

trading power driving *goods* across national borders. The exchange rate, according to the financial fundamentals, is set primarily so as to equalize the return on investment. As such, it is influenced by relative differences in interest rates, inflation rates and the risks of investment. It acts as a two-to-three year, or mid-term, counterpoint to the longer term trendline set by the trading power. As shown in Exhibit 11, the difference in the real (i.e. inflation-adjusted) interest rate gives a pretty good correlation with the deviation from the exchange rate predicted by the long-term trading power shown in Exhibit 9. Over the past 10 years, the period with

Exhibit 9
LONG-TERM EXCHANGE RATE AND THE TRADING POWER

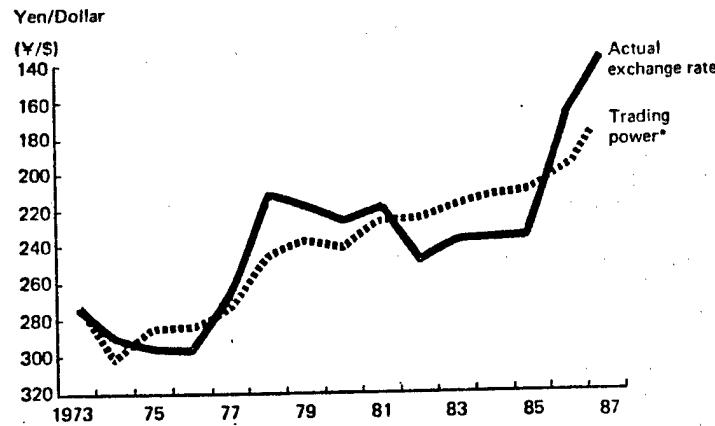
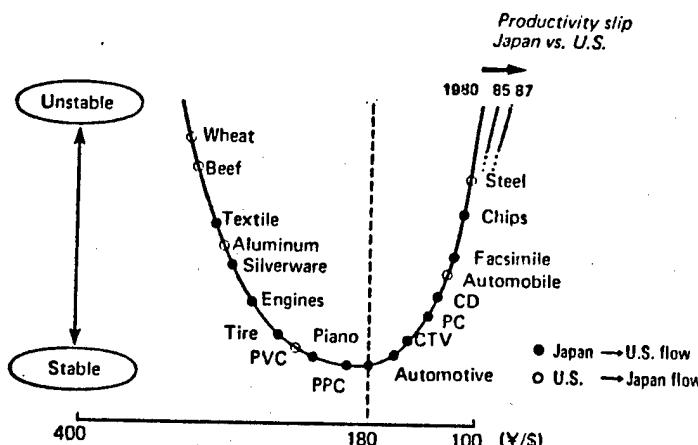


Exhibit 10

POTENTIAL CURVE FOR EXCHANGE RATE — TRADING POWER

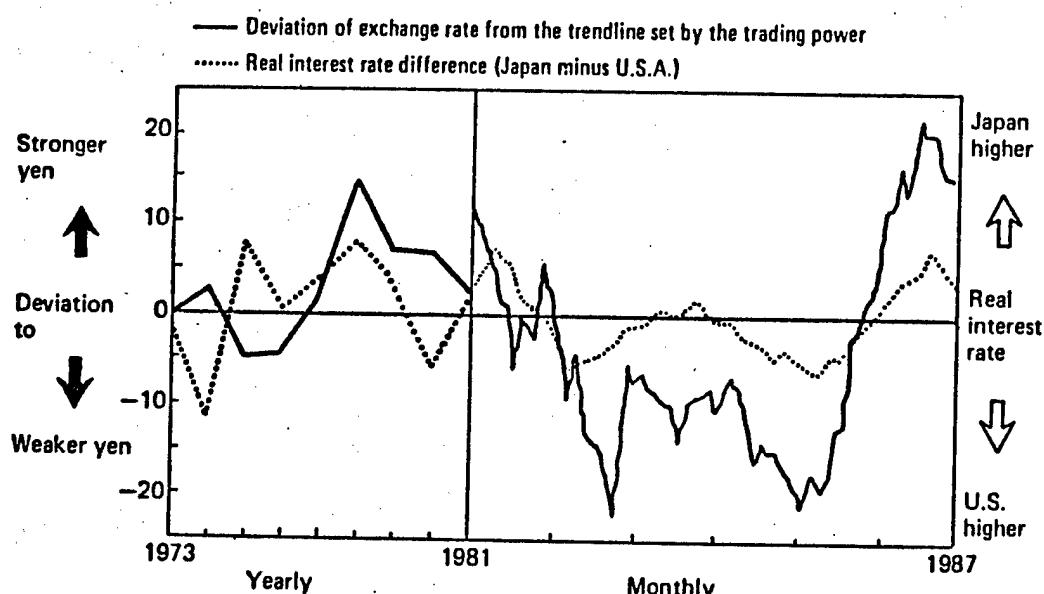


equilibrium. This means that the currency market could have multiple solutions, or saddles in the valley of the potential, and different points as "stable," depending on where the exchange rate is moving from, a phenomenon known in physics as hysteresis.

In the past, there has been confusion in meshing the effects of fundamentals and trading power, and treating productivity, interest rates, inflation rates and country risks collectively as variables also affecting the exchange rate. That is superficially correct, but we believe it will be more useful to say, for example, productivity affects trading power, and interest rate affects the financial fundamentals. One interesting

Exhibit 11

MEDIUM-TERM FACTOR: REAL INTEREST RATE

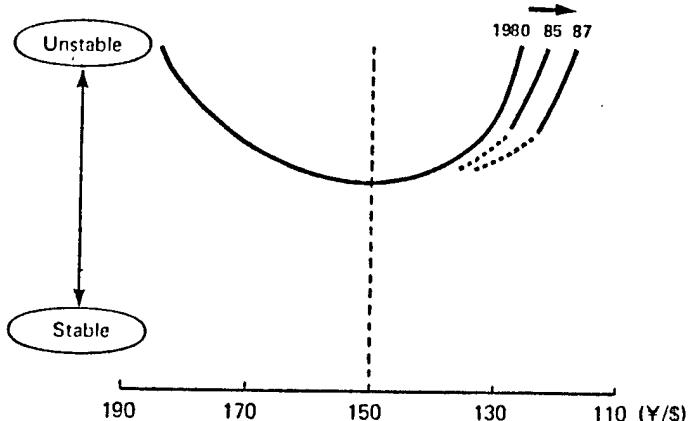


a higher real interest rate in Japan has resulted in higher yen than the trendline, and vice versa. The only exception has been the most recent period, when even the 6 percent interest spread has not produced stronger dollars. This unusual period is due to the effect of the political paradigm described below. It is

expected, therefore, that within a matter of several months, the currency adjusts itself to a more normal trendline.

As we have seen, the currency market behaves in a non-linear and non-equilibrium fashion, as opposed to, as most existing models are constructed, linear and

aspect of the fundamentals, or the asset movement theory, is that it does not have an optimal point *per se*. For someone who has transferred capital at Y220 to the dollar from Japan to the U.S., that is the starting point. Traders frequently "clear their position," and hence their optimal exchange rate changes with time.

Exhibit 12
**POTENTIAL CURVE FOR
EXCHANGE RATE BY FUNDAMENTALS**
*Fundamentals slip
Japan vs. U.S.*


However, longer term investments, such as real estate, acquisitions of companies, and treasury bills normally lag behind the day-to-day changes of the exchange rate. Hence, the stability of the fundamentals-driven exchange rate has an asymmetric potential curve, with a steeper gradient toward the unexperienced exchange-rate zone, such as the ¥130s yen/dollar range (Exhibit 12).

3. *The paradigm* in currency markets is like the "Delphi" method of predicting the future which no one knows for sure. For example, by asking a large enough number of well-informed persons, you would bet that, for example, a material that would exhibit superconductivity at room temperature will be discovered by 1992.

So, even if Prof. Lester Thurrow is completely off base, if a large enough number of influential persons like him say that the right exchange rate should be ¥130 which will move down to ¥100 in two years' time, then the paradigm valley gets deeper, and people start actually betting on it. As more and more people buy the yen to enjoy

the appreciation, it will actually happen that the yen would climb up to ¥100 to the dollar.

Upward momentum stops

If, on the other hand, a brave man with great credibility started saying, "No, the right rate is actually ¥200, since the Japanese economy is destroyed, and after all, the U.S. economy is much stronger than people thought." At that point, when the major upward move stops, and the rate of exchange-rate change becomes smaller than the interest spread between the two countries, investing in the dollar will become more attractive. As people move in the other direction, they start making exchange gains as well as interest gains. It becomes much more profitable to be buying dollars and investing them in interest-bearing instruments; the U.S. economy begins to enjoy an influx of capital and investments. Now most people would say, "after all, the right exchange rate is ¥200," which becomes the new paradigm.

In the real world, however, scholars and Kaufmans have

seldom influenced the critical turning points. As shown in Exhibit 13, powerful (exclusively American) politicians and high-ranking government officers have made the turns and accelerations. Thus, we have named this force "politi-

Political paradigms are a major reason why exchange rates are erratic

cal paradigms." The paradigms have been the major reason why the actual exchange rate has deviated so erratically from the more stable exchange rate expected of two other fundamental forces at work, namely, trading power and financial fundamentals.

Ordinarily, the political paradigm is a rather weak force, or a shallow potential to represent its shaky foundation. When a politician says that the right exchange rate is ¥94 to the dollar, he is using simple-minded linear thinking to generate the "J-Curve" effect to balance Japan-U.S. trade. This is fundamentally wrong because the currency market has no such thing as the "right" exchange rate.

A paradigm does not have to be true. It only serves on aggregate to offer currency dealers fairly good opportunities to make money, and a comfortable feeling that where they are isn't too far off after all. The current paradigm seems to be around ¥140 to the dollar, as Messrs. Reagan and Baker have expressed their strong point of view that, "This is where it should be, and we don't want it (the dollar) to go down further." It was not so long back when the same government created a totally different

Exhibit 13

CREATION OF PEAKS AND VALLEYS IN YEN-DOLLAR EXCHANGE RATE (1977-87)

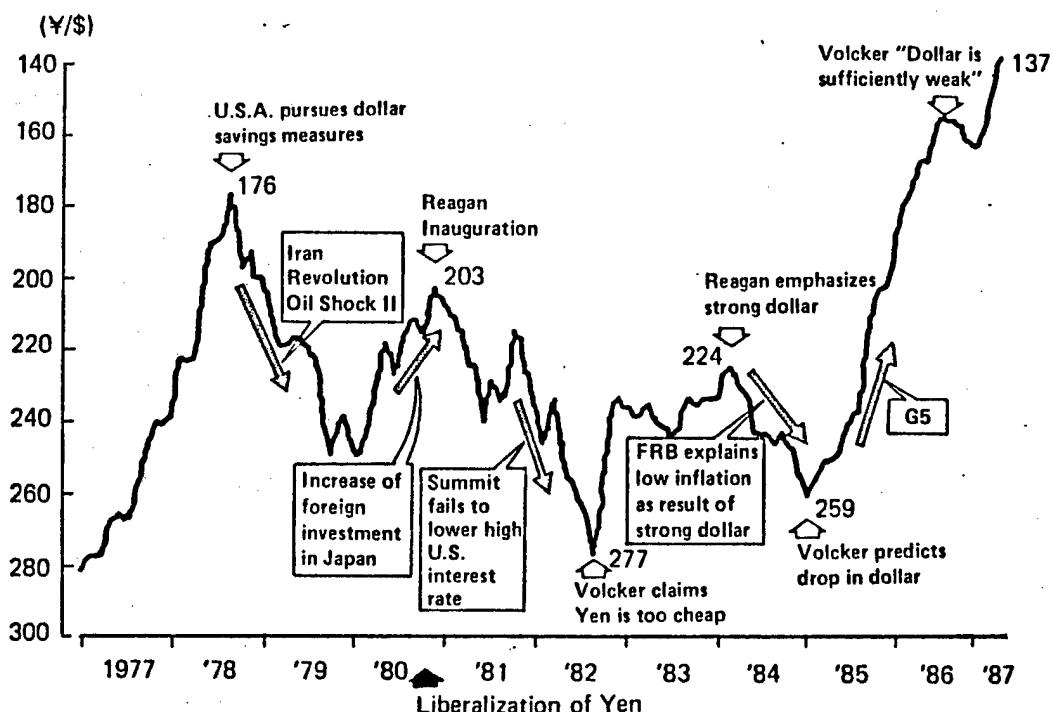
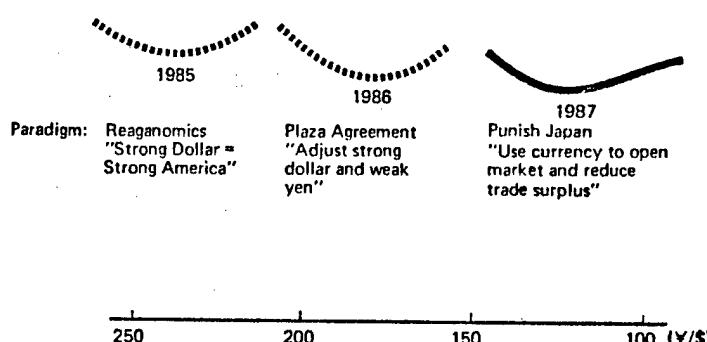


Exhibit 14

POTENTIAL CURVE FOR EXCHANGE RATE BY PREVAILING THEORY OR "PARADIGM"



kind of atmosphere, where a "strong America through strong dollar" was the governing thought (Exhibit 14).

Assets as a force

The so-called asset approach — that the movement of the asset itself sets

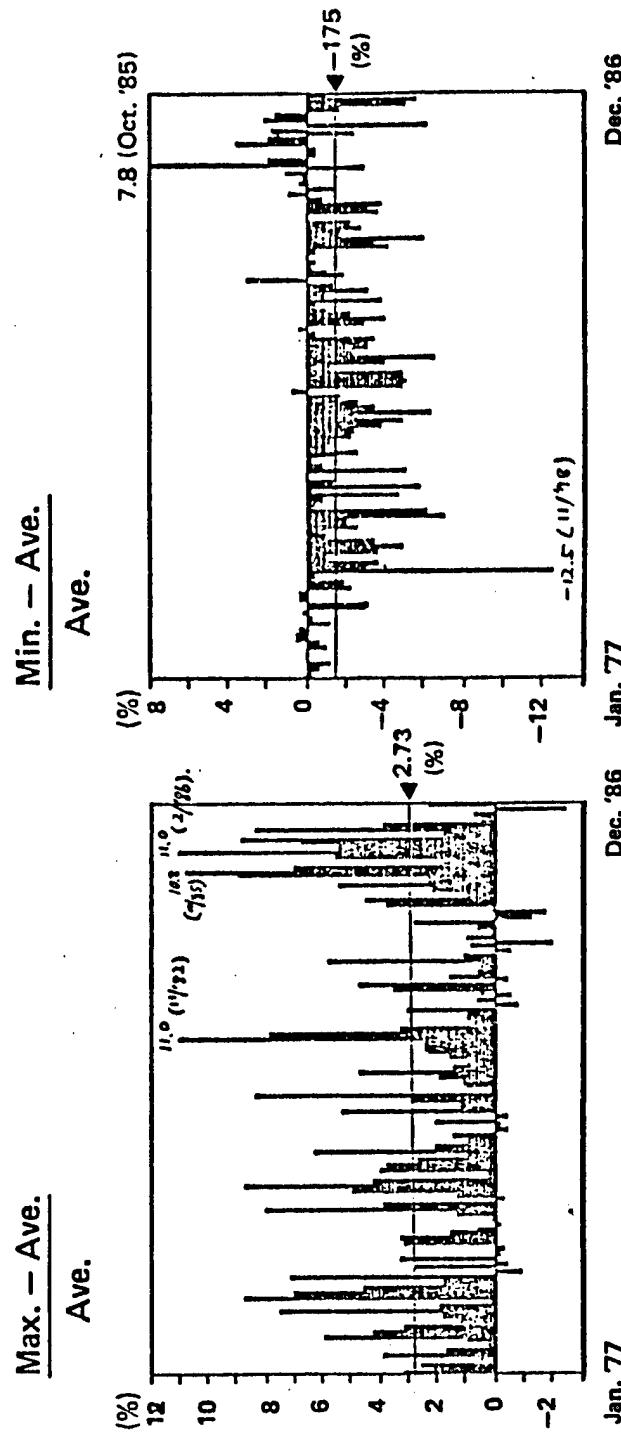
the rate — is explained as the force to change the paradigm. For example, if the exchange rate is ¥150/dollar and the paradigm is that it could be ¥140/dollar; what drives the rate from 150 to 140 is the market mechanism that additional purchase of the yen or selling of the dollar will give

traders attractive gains. So, a massive purchase of the yen takes place, only to accelerate the dollar's decline. At some point, the paradigm changes its extent, for instance, to 130, although it does not change its polarity (i.e., weak dollar is good). Asset moves tend to accelerate the change only to increase the instability of the market.

4. The traders' desire to make money may be endless. I originally thought that the currency traders needed to see the market fluctuate in order to make trading gains.

However, given the enormous short-term volatility shown in Exhibit 3, their needs are more than met through the daily, weekly and monthly hiccups which are not necessarily reflective of the longer-term needs to adjust economic fundamentals between the two countries in question. These fluctuations occur as the foreign exchange

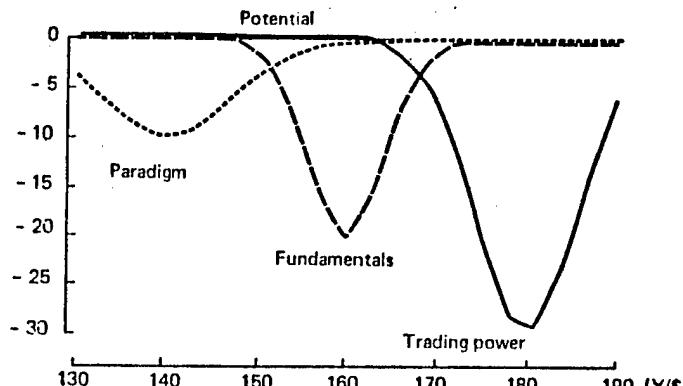
EXHIBIT 15 MONTHLY CURRENCY EXCHANGE RATE FLUCTUATIONS 1977–86



Max.: Maximum of the month
Min.: Minimum of the month
Ave.: Average of previous month

Exhibit 16

THREE BASIC POTENTIALS



market's self-corrective action from the basic trendline, which is set as the compounded effect of the three more fundamental forces described earlier. Exhibit 15 shows the monthly fluctuation relative to the average of the previous month. What this means is that, even during a period of general decline, there are opportunities within a month to clear a trader's position without a large loss and to take advantage of general trendlines. While the large surges based on the political paradigms have given money traders opportunities to make money, the peaks and valleys are not necessarily created by the traders. It would be safer to assume that the traders have had the "joy ride" with the paradigms, but they could be happy without the surges, so long as the short-term fluctuations yield 4-5 percent moves per month, or a 50 percent per annum for a constant winner.

Currency exchange model using potentials

Using the analogy of the non-equilibrium theory of

physics, as in phase transformation, we have tried to synthesize the different forces at work to explain the actual currency exchange rate. We define the curve's

—Depth as its impact, i.e., if a particular force is working strongly, it will be deeper

—Width as its diffusion, ambiguity, or ambivalence, i.e., if there are many different situations which would make the case diverge, then it will have a wider valley — volume of speculative money in the FX market, and the variety of goods traded (e.g., from beef to missiles) make the width bigger.

We have not been able to incorporate the non-linear nature of the market. Such a treatise would require a study of the impact of the interest rate (a factor in financial fundamentals) on productivity gains (a factor in trading power). One could argue that a lower interest rate would accelerate the capital investment to renew the production facilities, and hence help the productivity to improve.

At this stage, we assume that different forces form independent and different potential curves (Exhibit 16):

1. *Trading power* as the long-term and strongest potentials;
2. *Financial fundamentals* as the medium-term, strong potential
3. *Political paradigm* as the transient, weak potential, moving as a function of time, as the prevailing beliefs change.

As we have seen, the traders' money-making desires are more than met by daily, weekly and monthly fluctuations, and therefore we did not incorporate the fourth force in our model. A critical point to note is that these potentials suggest different optimal and stable exchange rates, as shown in Exhibit 17.

Since financial fundamentals are defined as the rate to equalize the expected return on investment in the two countries in N years' time, it will hold that

$$(1 + \text{Japanese real interest rate } i_J) = (1 + \text{U.S. real interest rate, } i_A) \times (\text{Y/\$ rate in } N \text{ years } R_N) \div (\text{Current Y/\$, } R_C)$$

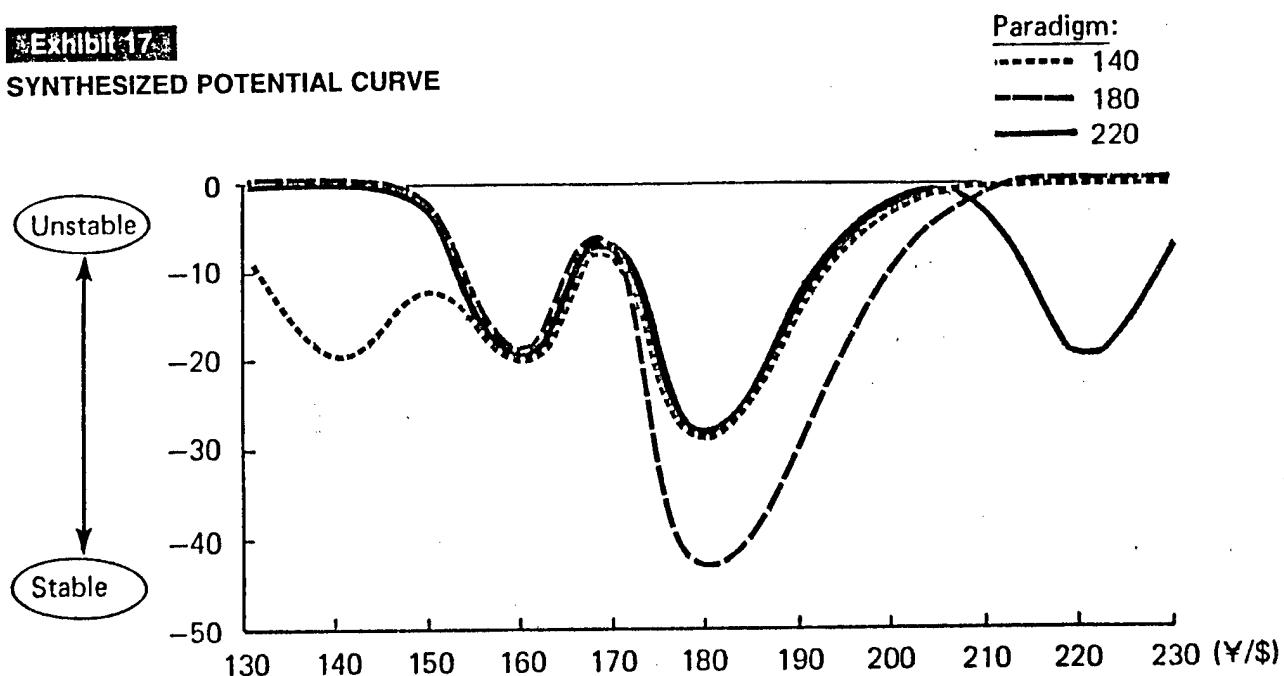
and expecting that

$$(\text{Y/\$ rate in } N \text{ years, } R_N) = (\text{Rate set by trading power, } R_{TP}) \times (1 + \text{Rate of relative productivity change, } r_{TP})$$

$$(\text{Current Y/\$, } R_C) = (\text{Rate set by trading power, } R_{TP}) \times (1 - \text{Deviation from the rate set by trading power, } \Delta_{TP}).$$

Ignoring the second-order terms, assuming annual changes are smaller than 10 percent, and making $N \rightarrow 1$, reflecting the medium-term nature in the impact of the financial fundamentals, we have

$$\Delta_{TP} \approx (i_J - i_A) + r_{TP} \quad (1)$$

Exhibit 17**SYNTHESIZED POTENTIAL CURVE**

In other words, the deviation from the exchange rate set by trading power is equal to the sum of the interest spread and the relative productivity slippage. Since we have empirically discovered that r_{TP} has been most closely associated with the relative difference in the wholesale price index, we have

$$\Delta TP = (i_J - i_A) + (WPI_J - WPI_A) \quad (2)$$

The result of our calculation shows that

- A rather stable band of "most likely" yen/dollar exchange rate emerges as a result of the composite effect of trading power and financial fundamentals, using Equation (2) (Exhibit 18). Width of the band is calculated using our best estimate of the potential curves for the two forces (TP and FF), and using the probability of transition from one point to another, reflecting the gradient of the potential curve, as schematically shown in Exhibit 19.

The transfer matrix is used to reflect the non-equilibrium

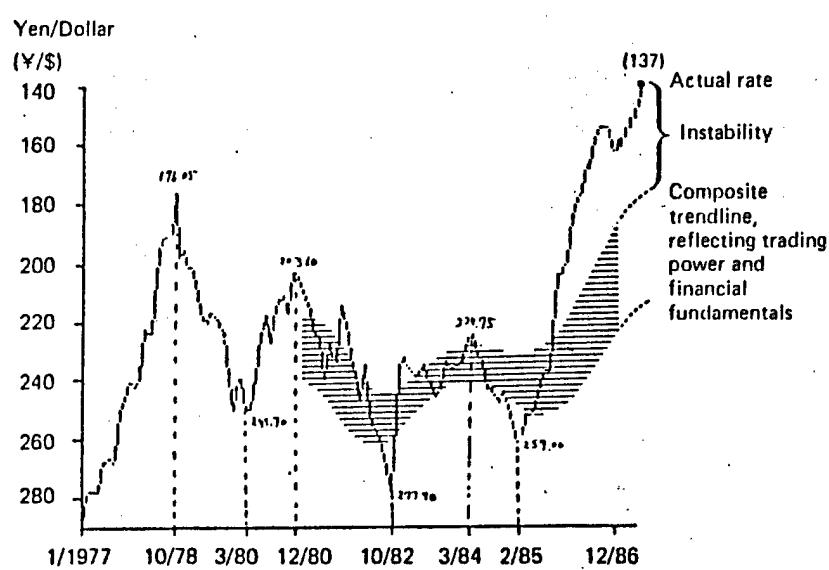
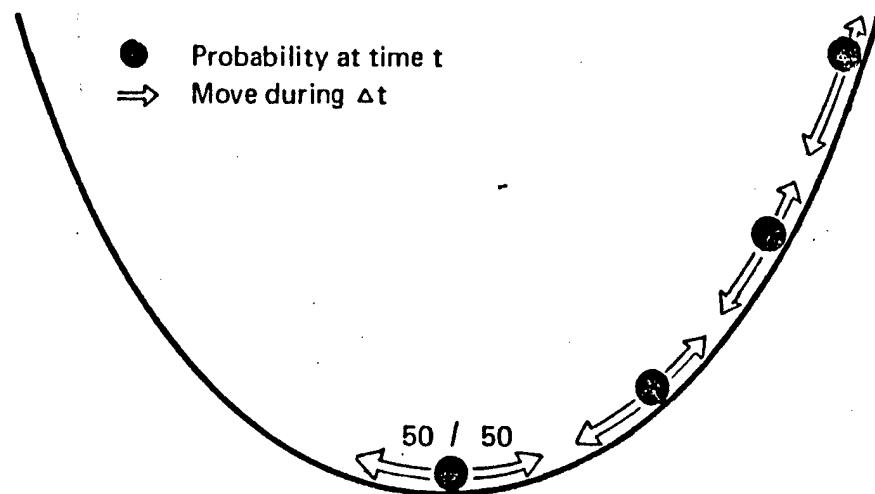
Exhibit 18**MEDIUM-TERM EXCHANGE RATE AND THE FINANCIAL FUNDAMENTALS**

Exhibit 19**PROBABILITY OF TRANSITION FROM TIME t TO $t + \Delta t$** 

Policy makers should keep quiet about what the 'right' exchange rate is

nature of the currency exchange rate. These results indicated that except for the occasional anomalies based on political paradigms, we can pretty much explain the recent past changes in the yen/dollar exchange rate using our model, based on the two principal forces. The recent rate at ¥137/dollar is clearly far from the rate explainable using the two principal forces, and hence is expected to be unstable. This model also enables us to predict the stable zones in the future, given the prediction on the WPI and real interest rates.

- When the third force, political paradigms, is added to this, we begin to see multiple-stable answers, or the saddles in the potential curve. Exhibit 17 shows the composite potential curve for three different values of the political para-

digm curve's central value, i.e., 220, 180 and 140 yen. If the prevailing paradigm were to become "180," it seems to accomplish the strongest strength and stability for the exchange rate at ¥180 to the dollar, although another, a bit shallower stability is also observed at around ¥160. With the paradigm of ¥140, there are three rather shallow saddle points at ¥140, ¥160 and ¥180. There will be some kinetic energy needed to overcome the small hill between ¥140 and ¥160, in order for the current exchange rate of ¥140 to go to another stable point at ¥160.

- Reflecting the hysteresis, i.e., multiple solution depend-

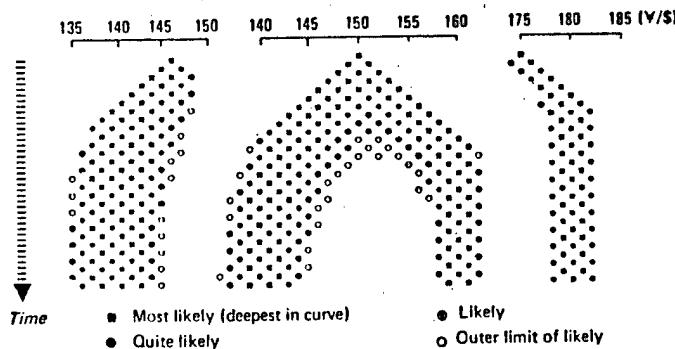
ing on history, we come up with totally different solutions depending on where we start. Even with the static paradigm of ¥140 — i.e., people believed in ¥140 all along — the optimal composite exchange rate could be different depending on where one starts. Exhibit 20 shows that, as time goes on, the probability distribution of where the synthesized potential is steepest (or deepest) takes a completely different pattern. If it starts at ¥145, it tends to ¥140; ¥175 tends to ¥180; and ¥150 splits into ¥140 and ¥160. This kind of phenomenon is not unusual in physics, as in the martensite transformation in working stainless steel. Depending on minute factors and speed affecting the transition, a totally different phase diagram emerges.

Unlike metallurgy, however, a currency demands only one exchange rate at a given time. This means that while the rate may be set by the minutest factor in transition, people living in the real world

Exhibit 20

HYSERESIS

(Trading Power = 180, Financial Fundamentals = 160, and Political Paradigm = 140 Y/S)



deepest valley lies in a reasonably narrow band of Y163 and Y184. Right after the turning point, the probability spreads into three distinctive possibilities, and shows, again, the possibility of great confusion and instability. These probability distributions over time show a remarkable resemblance to the real life fluctuation of the currency. They also demonstrate that while the two principal forces create a rather stable band of rate change, the political paradigms can create extreme peaks and valleys that can deviate far from the stable zones.

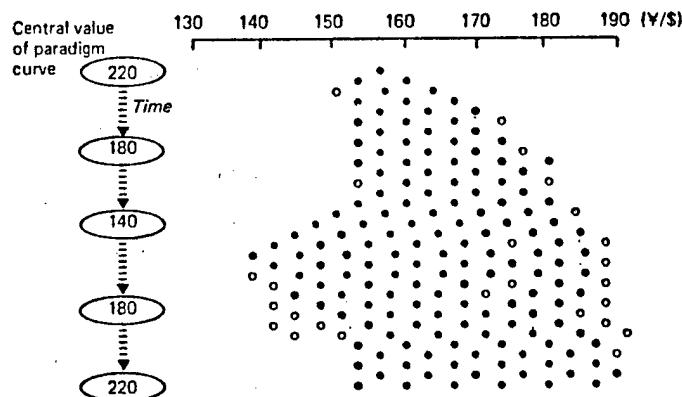
In sum, we have been able to demonstrate that

- Long-term rate correlates with trading power.
- Medium-term rate is affected by financial fundamentals.
- Paradigm, though possessing a weak potential, can swing the exchange rate when it is unsure and moved over time.
- Indeed, multiple answers are possible in the exchange rate as different and independent forces interact to determine a single rate.
- A probability distribution, such as Exhibit 14, best correlates with the exchange rate fluctuations in real life.
- When the paradigm is removed, or changed, the rate can approach a more normal one set by the two principal forces.

Exhibit 21

IMPACT OF PARADIGM CHANGE — I

Probability distribution of yen/dollar rate



must pay for it dearly. For example, if the paradigm of Y140 acted strongly to bring up the rate to Y145, then exporters of goods, whose equilibrium point may be Y180, will have to pay the price for it.

• Next, we can see how the exchange rate is affected by the change in paradigms. Exhibit 21 shows how ambivalent it gets when the prevailing belief changes from Y220/dollar to Y140. However, it also shows that the rate could quickly bounce back to the Y155-187 range as soon as the

paradigm swings back toward Y220. In fact, if one traces the outer bounds of the dark dots, most probable range, one finds that once paradigm changes, the real rate is quickly pulled back by the more fundamental forces.

Another simulation of the probability distribution of yen/dollar exchange rates is shown in Exhibit 22. Here, the paradigm change is lower in magnitude and slower with respect to time. In this case, while the composite potential spreads all over the place, meaning any rate from Y130 to Y190 is probable, the

Implications of the potential model

Admittedly, our model at this stage is to a large extent intuitive, although we have made our best effort to plug in available numbers. While we are still trying to develop more empirical and/or theoretical methods to come up with the shape of each potential, we believe this approach

merits wide criticism and study. for, unless our approach is fundamentally wrong, the implications we can draw from these simulations are quite significant:

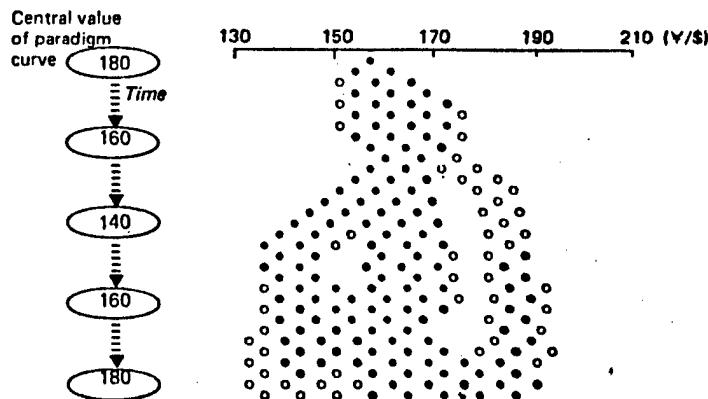
- We have observed that the short-term profit-making opportunities in the FX market is much more attractive than any interest-bearing instruments. This means that the governments, trying to adjust flow of goods and money through adjustment of interest rates, are out-dated, or are not going to be effective, to say the least. However, as we have seen, the interest spread between the two countries can affect the medium-term flow of funds, and hence the exchange rate. However, when there is a strong political paradigm to push the dollar value down while at the same time trying to accomplish the inflow of foreign money into the U.S., this is an infertile effort.

To make the interest-based policy effective, the political paradigms must be removed, or be realigned to be in concert with the direction of the two principal forces at work. Government should recognize that long-term competitiveness can result only through curbing inflation, as evidenced in WPI, which in turn is accomplished through real industrial productivity improvements. It should also

A trade imbalance, per se, does not change the exchange rate

recognize that medium-term, i.e., two to three years, it can adjust the currency exchange rate by the interest rate.

Exhibit 22
IMPACT OF PARADIGM CHANGE — II



However, there is a certain limit to this ability, because the changes in the interest rate is going to affect the WPI and/or productivity gains. This is one of the reasons why the currency is non-linear. However, we have not fully developed the non-linear treatment in our model at this stage.

- Policy makers and renowned scholars should be silent on where the "right" exchange rate is. This eliminates the impact of an unstable paradigm, and allows the rate to be set by the two principal forces only, trading power and financial fundamentals. That sets a much stabler and slower movement, and removes unnecessary volatility in the market. Although speculative market participants may still want to enjoy profit-making opportunities, such needs are satisfied completely by the short-term fluctuations, amounting to 4-5 percent per month. These "hiccups" will center around the fundamental trendline, and will not dare deviate from it too far. The money traders are basically cowardly people by virtue of the fact that it is a high-risk zero-sum game. They can be likened to a scared swimmer whose toe must touch the bottom of the river bed. However, if experts and authorities

say that he can go deeper and enjoy a faster flow without fear, he'd be tempted. The lack of such advice, on the other hand, will scare him enormously, and he, as well as his colleagues, will tend to swim back to the shoreline.

• A trade imbalance, per se, does not change the exchange rate. A bilateral trade imbalance is the result of the two countries' trading power. If Country A keeps buying goods from Country B, it will run out of money and stop. However, the money left in Country B must be used. If it is used to improve productivity and social infrastructure, then the trading power and fundamentals of Country B will improve, and then, and only then, the exchange rate will turn in B's favor. If, on the other hand, Country B could not find the use for the excess money and recycled it to Country A, then the net position is unchanged. In the long term, trade deficit must equal capital account.

The exchange rate changes as a result of trade imbalances, only because of the paradigm that higher (or lower) rates reduces the imbalance. Often in today's developed world, trade imbalance is the result of industrial specializa-

tion, rather than international competitiveness. So long as there is a commensurate recycling of money, it should not fundamentally affect the exchange rate per se.

• Government intervention in the market tends to make money traders more aggressive. If the Bank of Japan or New York's Federal Reserve Bank "intervened," it tends to create statistically more "winners" than losers in the market. The notion of a zero-sum game is the only built-in stabilizer in this already unstable market. It is the fear of losing that makes the market recover its sense of balance. If the government is ready to buy dollars when everyone wants to sell, it acts as a volunteer to lose. "Leave them alone and give them no hint" is the best way to make use of the two stronger forces, i.e., trading power and financial fundamentals.

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MOF TAX BUREAU'S ROLE IN REVISING TAXATION SYSTEM DISCUSSED

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[Text] The Ministry of Finance (MOF) Tax Bureau staff is merely 100 strong. It is the smallest bureau within the ministry. Of the budget-related three bureaus, compared with 350 of the Budget Bureaus and 370 of the Financial Bureaus, the Tax Bureau is significantly smaller.

Nevertheless, as a section that handles the revenue side of the budget, it is the second most important bureau in the ministry after the Budget Bureau. When we look at 17 vice ministers since 1965, we see that 12 came from the Budget Bureau, 4 from the Tax Bureau and 1 from the Banking Bureau.

The Tax Bureau's greatest work is the yearly tax revision. FY 1987 is the first year of major tax reform since SHOUP Recommendation in 1949. For this reason, the average time for the staff to leave the office has been 4-5 am. But they are committed to working behind the scenes in the tax reform, supporting the Liberal Democratic Party's [LDP] Research Commission on Tax System (chairman: Sadanori Yamanaka) and the government's Taxation System Council (chairman: Takekazu Ogura). They know too well that for bureaucrats to be spotlighted regarding taxation--a matter concerning the basis of democracy--would be disadvantageous.

Nevertheless, it is a well-known fact that the government's Taxation System Council is the spokesman representing the Tax Bureau. Even the powerful LDP Research Commission on Tax System merely acted on a stage set up by the bureau. This is clearly demonstrated by the fact that in spite of fierce opposition, two major reforms--introduction of sales tax and interest tax was decided. The MOF Tax Bureau--a small group of experts--is the behind-the-scene producer of the tax system reform.

Failures of 1975-85 As Springboard for Change

For the MOF Tax Bureau, 1975-85 was a decade of repeated setbacks. First of all, there was the so-called "General Consumption Tax" detailed in the FY 1979 Tax Revision Recommendation which the government's Taxation System Council recommended to implement from FY 1980.

This new tax was recommended in order to reduce national debt which had become very sizable since the deficit-financing government bonds were initiated in FY 1975. It had a strong supporter in then Prime Minister Ohira, a former MOF official, and persevered all the way to become the election campaign issue. But the results was disasterous. MOF's dream died when the LDP lost heavily in the general election.

Next was the Green Card System. It was taken up in the FY 1980 Tax Revision. The bill went through the Diet and was scheduled for implementation from January 1984. But when a large-scale fund shifting took place, the plan was frozen and later abandoned. Ostensibly this proposal's purpose was prevention of abuse of the tax free interest saving systems such as maruyu and postal savings and inclusion of interest and dividend incomes in the taxable income. The Tax Bureau's real aim, however, was to lay the foundation for introduction of tax payer I.D. numbers.

In addition, in the FY 1984 1 trillion yen revenue neutral plan, it failed in imposing tax on office automation (OA) equipments, and in FY 1985 the LDP's Research Commission on Tax System put an end to the plan to impose low rate tax on interest on tax free interest savings.

Meanwhile the tax revenue trend during this period of stable growth of Japanese economy had changed from the 1965-75 period when natural increase in revenue was taken for granted. There was a sizable loss of annual revenue of 3.33 trillion yen in FY 1981 and 6.11 trillion yen in FY 1982. Amidst this, it was natural that the Tax Bureau became downhearted and its relative status within MOF declined. It can be said that for the Tax Bureau, the 1975-85 decade was a dark era.

But the social climate was gradually changing. One was a growing dissatisfaction with the unfair taxation system among salaried workers whose tax burdens were in a real sense increasing.

Meanwhile, since deficit-financing government bonds were issued, the government's financial state has been becoming steadily worse. At budget compilation time each year, the MOF has been preoccupied with the task of filling the huge gap between revenue and expenditure. One way was tax increase. The industrial sector was asked to shoulder this burden primarily. This is why Japan's effective corporate rate of tax became the highest among the developed nations at 52.92 percent. The salaried workers agitated for correcting unfair taxation and the industries cried out against increased tax burden. The backdrop for tax reform was thus established. The Tax Bureau did not miss this chance.

A "Realistic Approach" That Accounts for Political Initiative

The Tax Bureau announced the starting of tax reform in the FY 1985 tax revision recommendation by the government's Taxation System Council. It was submitted to Prime Minister Nakasone on 19 December 1984. Prefacing the

document with--"though it is unusual to raise this issue in an annual recommendation," it expressed the bureau's determination in these words: "Now is the critical time to effect a radical and fundamental revision regarding both direct and indirect taxes. It should not be a piecemeal patch up solution but a fundamental revision."

In writing this report, the Tax Bureau was convinced through the members of LDP's Research Commission on Taxation System such as then-chairman, Mutsuki Kato, then-advisors, Tatsuo Murayama and Sadanori Yamanaka, and then-Vice Chairman, Ganri Yamashita, that the party's situation had changed from the time when the "General Consumption Tax" was introduced. Moreover, it was aware that the business leaders led by then-chairman of Federation of Economic Organizations Yoshihiro Inayama were strongly for breaking the traditional pattern of increasing corporate tax to take care of the government's financial rebuilding effort. The Bureau conducted thorough "feasibility study."

But at that point the Tax Bureau did not have a clear-cut policy regarding this major tax reform since the Shoup Recommendation. It was still entrenched in pursuit of an "ideal" tax structure of the 1975-85 era. The man who shifted gear and led the bureau to the current "realistic approach" was Masaru Mizuno who became director general of the bureau in June 1985.

If we characterize the Budget Bureau as power oriented and the three monetary bureaus as market oriented, the Tax Bureau can be described as system oriented. This is because it emphasizes systematic theory in dealing with taxation which requires a sense of intricate balance. As a result, the Tax Bureau tends to fall into unrealistic idealism. An example of this is the Green Card System which sought to establish a consolidated tax system.

Tax Bureau Director General Mizuno is a well known tax professional. Since joining the ministry in 1955, he has been in the tax field exclusively. He is not only well versed in tax theory, he is thoroughly familiar with the weight of politics on tax legislation.

Since the day of his appointment, the Bureau has been in a state of tension since Mizuno works hard such as staying late at night to review papers. Throughout endless nightly discussions, Mizuno has persuaded his staff to pursue realistic ideals while compromising political reality, according to a mid-level Tax Bureau official.

In the personnel changes of 1986, Mizuno remained as director general as well as Councilors Tsunaaki Oyama and Mamoru Ozaki. Mizuno appointed Tadashi Ogawa, the bureau's foremost theorist, as the director of the Coordination Division. Koji Tanami and Nobuaki Usui, top ranked in their classes, were appointed as directors of the First Tax Division and the Second Tax Division. Furthermore, Coordination Division Director Eisuke Hamamoto was appointed as the director of the Overall Coordination Division, Second Tax Division Director Sohei Hidaka as the secretary to the minister and Tax Bureau Senior Officer

for Research and Planning Tadashi Iwashita as the director of the Public Relations Division. By this line-up, the MOF made clear its stance to tackle tax reform as the ministry's project.

The realistic approach became clear to everyone in September 1985 when the Taxation System Council was asked to study revision of taxation system. Prime Minister Nakasone directed that first priority be given to tax reduction: "first of all to come up with measures for reduction and rationalization of tax burden and then to come up with an overall direction for tax reform, including measures for securing fiscal resources for tax cuts."

The Tax Bureau was involved in making this inquiry statement, but Nakasone's obvious political tactics predicated on the upcoming election was widely criticized within the bureau. Not only was it incompatible with the MOF position, the staff feared the politicians would take only tax reduction.

In the end, however, they accepted the inquiry statement with a condition that revenue neutral would also be emphasized, and gambled on siding with the Nakasone administration. It is true that such Tax Bureau performance which allowed the politicians to take leadership was criticized by influential former MOF officials and others as "lacking principles of taxation." But as a result of choosing a realistic approach, the bureau was able to have a good grip on promotion of tax reform, that the predecessors were not able to accomplish.

The Cost of the "Great Reform"

Although the impression after the fact is that the Tax Bureau was in control throughout the entire process, in reality it had to deal with a succession of obstacles.

The trial that came almost simultaneously with the inquiry session was the addition of special members to the government's Taxation System Council. Of the 10 "rough horses appointed by Prime Minister Nakasone in September 1985, the only one that the Tax Bureau could control was former Tax Bureau Director General Takashi Hosomi, the president of the Overseas Economic Cooperation Fund. Koji Nakagawa, Nomura Research Institute President, Kiyoshi Iijima, a political commentator, Shunpei Kumon, Tokyo University Professor, were all members of Nakasone's brain trust. Although the Tax Bureau elected to team up with the Nakasone administration, the addition of these members indicated the prime minister's dominance in the government's Taxation System Council deliberations.

Here again the Tax Bureau's response was quite realistic. Basically the strategy was to accommodate the prime minister by placing rough horses as deputy-chairmen of three special committees and at the same time, to try to explain to these tax amateurs the basic principle of tax reform.

A high ranking official of the bureau stated that, "though they said this and that in the beginning, when we explained logically, step by step, they understood in the end." Compared to the task of persuading Tax-zoku members representing special interest groups who employ unlogical arguments, the "rough horse" persuasion was easy.

In fact, Jiro Ushio, chairman of Ushio Inc., the Second Special Committee Deputy Chairman, a strong advocate of tax system reform for salaried workers, for instance, offered strong support to the bureau's undertaking. It was ironic that comments from Chairman Ogura, a one time bureau spokesman for an idealistic, consolidated taxation system, posed the greatest difficulty to the bureau.

The most threatening incident for the bureau was Prime Minister Nakasone's campaign promise in last July's double election that: "I will not adopt what is called large-scale indirect tax that the citizenry and the party members oppose." If we carefully examine his comment, it is clear that he chose his words carefully so as not to be committed to a particular course of action, but it was clear that the public could not be depended on to make a detailed interpretation.

There was also a concern that perhaps Prime Minister Nakasone's campaign promise reflected his true intention. Although the bureau went on the Nakasone bandwagon, no trust relationship such as the one the bureau had with former Prime Minister Ohira existed between them. The alliance was merely a practical tactic for realizing the goal. At this point, the Tax Bureau led by its director general Mizuno feared for the collapse of their "realistic approach" that assumed compromise with politicians.

There were differences of opinion within the bureau regarding the course of action to be taken after the overwhelming LDP victory. Councilor Mamoru Ozaki, who is in charge of indirect taxation, proclaimed that the government's Taxation System Council that had been suspended during the election should reconvene soon and the citizenry be informed regarding the content of the large-scale indirect tax package.

In contrast, Director General Mizuno's stance was cautious, saying: I will decide after we hear from each and every LDP Diet member regarding what he/she said in respective electoral district and what he/she is thinking of now." In the end, the government's Taxation System Council did disclose three proposals regarding the "New Indirect Tax" in late July, but at the same time, the Tax Bureau decided to expound on the need for increased indirect tax and tax on interest as a fiscal resource for tax cut in the tax reform package.

This is the so-called "Pilgrimage to 500 people." Its target was not limited to the ruling party members, but extended to the opposition parties, economic and media circles. It was little wonder that this PR caravan for realization of tax increase would not be welcomed.

There were many problems that the Tax Bureau had to clear between summer and year end. A clever strategy of preparing three options was adopted to deal with the distribution industry which would oppose to retail sales tax. Three options were the manufacturer's sales tax (Plan A); sales tax which exempts sales between businesses (Plan B); and Japanese-type value added tax (Plan C). Representing primarily the manufacturers, the Federation of Economic Organizations' Taxation System Committee Chairman Eizi Suzuki publicly endorsed Plan C in order to banish Plan A and neutralized the voice of the distribution industry in the federation. The Tax Bureau used the classic tactic of divide and conquer.

But then, persuading Prime Minister Nakasone who at that point was revealed as a Plan A supporter was not easy. LDP Research Commission on Tax System Chairman Yamanaka's help was needed.

Yamanaka had been a young lieutenant along side Nakasone in the old Kono Faction. He can speak on an equal footing with the Prime Minister. Moreover he is an expert on the tax system who boasts that, "I taught taxation to Mizuno."

It was only natural that the Tax Bureau emphasized laying groundwork to get Yamanaka's support. It was true that in the beginning, they feared "Lone Wolf" Yamanaka's recklessness, but in reality, there was no need to fear. Although there were disagreements in detail--postponing inheritance tax reduction and mutilating a plan to revise deductions from salary income, there was no basic disagreement between the two regarding the main points such as tax on interests and the Plan C. Yamanaka stressed the process and although the Tax Bureau complains that "because of Chairman Yamanaka, our work greatly increased," (Tax Bureau high-ranking official), the difference was limited to that.

Yamanaka formed LDP Research Commission on Tax System Executive Committee composed of pro-MOF figures--Advisor Murayama, Vice Chairman Yamashita (Sub Committee Chairman) and himself. Thus the three legged race team between the party and the Tax Bureau was created.

Then came the meeting between influential members of the LDP Research Commission on Tax System and Prime Minister Nakasone in October. Superficially both parties agreed to respect Nakasone's campaign promise but the predominant interpretation is that Yamanaka pressed for adoption of Plan C and abandonment of Plan A. In order to implement the tax system reform the prime minister had no recourse but to agree.

At this point, the bureau was prepared to compromise that businesses with annual sales of ¥100 million or less would be exempted from sales tax payment and the categories exempted from sales tax would be expanded. Also the bureau was aware that regarding its last hurdle--tax on postal savings--it would have to approve an autonomous management of some postal savings funded by the Ministry of Posts and Telecommunications. In order to realize a major reform, a certain price has to be paid and that was the method adopted by the Tax Bureau in controlling Yamanaka's Research Commission on Tax System.

Savior for Declining MOF Position

The critical focus of the ordinary session of the Diet which convened on 26 January was tax and defense expenditures. The Tax Bureau submitted four bills: "The Bill to Revise A Portion of Income Tax Law," "The Sales Tax Bill," "The Bill To Implement the Revised Income Tax Law and the Sales Tax Law" and "The Bill to Revise a Portion of the Special Taxation Measures Law." The Diet was in an uproar from the beginning because the prime minister's policy speech did not mention sales tax. A high-ranking Tax Bureau official was not overstating the case when he commented that "we cannot rest peacefully at night until the bills are passed."

In the beginning, the Tax Bureau wanted to submit one tax system reform bill but the cabinet's Legislation Bureau showed reluctance about including new sales tax proposal in one comprehensive bill. Thus the bureau was forced to set it up separately. But in order to attain revenue neutral, the implementation bill contained an implementation date for tax cut as well as an introduction date for sales tax. That is, the bureau took care to insure that the sales tax bill alone will not go down.

But there is no question that the tax system revision related legislative proposals will be used as a confrontation weapon between the ruling party and the opposition parties. Already the four opposition parties--Socialist, Komeito, Democratic Socialist and Shaminren--organized a "Committee to oppose Sales Tax," and has begun to actively campaign for opposition.

In any case, the Tax Reform will become a reality if its final obstacle--Diet deliberation--is cleared. Then, there is no doubt that the Ministry of Finance whose declining status has been noted as Japan's fiscal situation worsens, will make a comeback and its greatest contributor, the Tax Bureau, will "power-up" its position.

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